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ASSEMBLING

METAL INDUSTRY

PLATING
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Editorial Comment

Yesterday, Today and Tomorrow

FOR the first half of the year business in the metal industries recorded very gratifying gains. The past few months have not fulfilled the early promise of 1937, but we agree heartily with authoritative opinion that what we are experiencing is not a new depression getting under way, but simply a decline in the recovery phase. Its main cause is that business men lack confidence in the prospects for profits.

Perhaps that is not the whole story. Perhaps there are other causes such as over-enthusiasm last Fall and Spring; the gradual diminution of the danger of a widespread war, with the result that speculative buying of raw materials has almost ceased; perhaps it is the continued lag of building and construction. Nevertheless, when all of these factors are added up, we still find that 1937 business will total more than 1936. It has been a good year.

Peering into the future is a sport to which everyone is addicted, and the best informed opinion at this time seems agreed that our present condition is not a depression but rather a period of breath-catching. The worst that it can be called as yet is a recession. There is nothing to prove that 1938 will not be a good year for those who work hard, produce good products at prices commensurate with their markets, *and sell energetically.*

Metals and Finishes in Automobiles

THE four automobile shows held in New York during the week of October 27 to Nov. 3 (reported on page 608 of this issue) pointed clearly the direction which the automotive industry will take in 1938. Dependability, safety, operating economy, comfort and appearance are the outstanding features of the new models. Metals continue to do well in the construction of cars. Copper radiators and zinc base die cast radiator grilles, louvres, interior hardware, etc., hold their long lead, established during the past years. A particularly interesting application is the use of aluminum alloy pistons with a tin plate. Finishes showed interesting development. Rust-proofing is pointed for wider use; synthetic resin enamels have made tremendous gains in surface coatings.

The most encouraging feature of the show was the clear recognition of the consumer demand for high grade materials to provide safety and durability, and fine finishes to give the attractive appearance which is now an indispensable element in motor car manufacture.

Fair Professional Competition

A REPORT on Unfair Competition, has come to our attention, published by the Association of Consulting Chemists and Chemical Engineers. The report points out the high quality of scientific and engineering services available from independent consultants and laboratories, and the competition which they are forced to meet from Government bureaus and agencies, educational institutions and "sales service." Their conclusions are that consulting and laboratory services by institutions are considered unfair competition when rendered (1) by tax supported institutions; (2) by educational institutions; (3) by a manufacturer not in connection with the purchase or use of his own products; (4) by any organization incidental to its principal business which is in another field; (5) by persons or organizations which lack adequate equipment, experience and technical qualifications; (6) when the service is represented as being adequate but in fact is not adequate; (7) when the service is represented as independent but in fact is partisan; (8) when the service is represented as being performed by a person or institution but is not performed by that person or institution, or is performed without responsibility on the part of that institution.

The report merits careful study.

Automobiles in 1938 Will Use High Grade Metals and Fine Finishes

The Annual Automobile Show held in New York discloses new trends of construction and design, featuring dependability, safety, operating economy, comfort and appearance.

By M. W. SCHWARZ
Chemical Engineer

WHAT the automobile means to the metal industry is so universally known that it needs no elaboration. As the consumer of millions of pounds of metals and the provider of millions of square feet for plated and finished surfaces, it is clearly one of our most powerful supports. Consequently the annual Automobile Shows have a deep importance to the metal manufacturing and finishing industries. The new models show trends; they show us how, where and how much metals and metal finishes will be used in the coming year by this huge consumer.

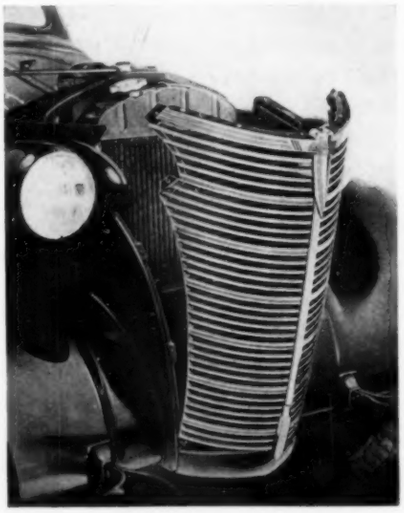
In New York City, during the week of October 27th to November 13th, four Shows were held. The largest was the Annual Automobile Show at Grand Central Palace. The others were the General Motors Show at the Waldorf-Astoria, the Chrysler Show at the Chrysler Building and the Ford Show at the Ford showrooms. From these displays the plans for 1938 were clearly evident.

Appearance Refined But Not Radically Changed

The automobile of 1938 does not differ markedly in appearance from its predecessor. The dictates of good taste have prevailed, and the best and most widely accepted features in styling have been returned and refined. The trends most emphasized are safety, roominess and convenience, economy, and an appearance of fleetness.

Die Castings In Wide Use

Although extreme streamlining has been discarded, radiator ornaments, handles, hood louvres and other protuberances follow the contour of the car body and are less in evidence. Radiator grilles, in most cases, are zinc alloy die castings, chrome plated. Buick, Chevrolet, Nash employ enamel striping in color, to relieve the bright metal surfaces, and Hudson protects the unplated surfaces with clear lacquer. A grille of stamped and enamelled metal is used by Ford. The general adoption of die-cast grilles is due to the uniformity obtained in dimensions, shapes and appearance. Chrome plated die-cast hood louvres are generally used, although Cadillac employs stainless steel for this purpose. Included among the exterior parts, now usually made of zinc alloy die castings, are windshields and window frames, brackets and rims of lamps, hardware, decorative strips, and hood ornaments. The latter now serve as a lock for the hood when lowered. Large bumpers, with somewhat higher guards, chrome plated throughout or with enamelled striping, are standard equipment. The large hub and spoke caps now generally used are also chrome plated.



Chevrolet's die cast 1938 *radiator grille is easily removed and the core can be dismounted without disturbing any engine part*

Interesting Special Features

An interesting new development is found in the Packard rear leaf springs. The end of each leaf carries small cup-like depressions. Rubber inserts are fitted in the five upper leaves, and a soft metal alloy in the two lower leaves. This design is said to improve riding qualities and reduce friction.

Oldsmobile has a built-in radio aerial concealed in the running boards, following the evidence of a survey which showed a demand by motorists for inconspicuous aerials.

Rust-proofing

Rust-proofing is pointed for wider use in the automotive industry. Some of the large users are Cadillac, Pontiac, Buick, Nash and Chrysler, whose fenders and other sheet metal parts are bonderized. The bodies of Chevrolet half-ton pick-up trucks are dipped to prevent rusting. Synthetic resin enamels as finishes have gained much headway, due to their excellent appearance and durability.

Interior Furnishings Feature Beauty and Economy

In furnishing the interiors of the new models some interesting changes have been made. Many of the instrument fronts and knobs are chrome-plated die castings; also radio grilles, instrument bezels, ash receivers, and glove compartment doors. Switches, knobs and handles are placed as nearly flush with the panel as possible, in the interests of safety. Steering wheel hubs are chrome plated die castings, frequently with steel inserts. Zinc alloy

die castings are widely used for a number of other interior parts, including window regulators, lock parts, dovetail assemblies, steering column brackets, horn rings and horn bodies, hardware, the housing and auxiliary parts of car heaters, vacuum cylinder parts and lighting generator pulleys. Despite the

Trunk and body lines flow together in Nash sedan models. Note the handsome, sturdy chromium plated bumper.

use of plastics, die castings continue to make great headway in the automotive field.

Air Conditioning of Cars

Among the unusual features in car interiors is the air conditioning system in Nash cars for winter driving.

The interiors of trailers are furnished with house type hardware. Copper screening is fitted in the windows, and the ventilators in the top interior have screens and frames that are hot-dip galvanized.

Tin Plated Pistons

Aluminum alloy pistons are used in a large proportion of the new cars. Cadillac, Chrysler and Plymouth increase the resistance to wear of this alloy, by giving it a hard anodized surface finish; Studebaker plates with tin, to prevent scuffing in extremely cold weather, and to reduce the breaking-in time. Chevrolet truck engine pistons are made of cast iron, electroplated with tin.

Metals in The Motor

Aluminum alloy or aluminum cylinder heads are used by Fiat, Graham and Lincoln-Zephyr. For the cylinder block and crankcase, Hupmobile employs heat-treated, chrome-nickel iron-alloy castings. Packard has increased the size of its radiator shells. Franklin connecting rods have copper-lead bearings, containing 30 to 50 per cent lead; also graphite. The spark plug bushings of this car are made of aluminum bronze.

Consumer Demands Call for High Grade Metals and Finishes

In considering the present and future trends in automobile design, no better information can be obtained than that disclosed by the survey conducted by General Motors. Questionnaires were sent to about 2,000,000 motorists, owners of all makes of cars, and residing in all parts of the United States. The general characteristics demanded, in the consecutive order of their choice, are as follows:—

First conditioned air cars for winter driving make their appearance this year. This unit—an introduction of Nash Motors—does the work. It is installed beneath the cowl and uses the cowl ventilator as an intake. A development of great promise for the metal industries.

1. Dependability.
2. Safety.
3. Operating economy.
4. Comfort.
5. Appearance.
6. Ease of control.
7. Smoothness.
8. First cost.
9. Pick-up.
10. Speed.

This grouping should be significant to the metal industries. Dependability, safety, operating economy, and appearance are near the top of the list, whereas first cost is near the bottom—significant of the automotive industry's need for better parts, better accessories, better material of construction, and better processing. Among the specific wants shown by the survey were factory-installed heaters and radios, larger gas tanks, inconspicuous radio aerials and rust-proofed fenders. The badly rusted aerials now to be seen on the tops of many cars may explain the demand that aerials be made inconspicuous. It is probable that rust-proofing processes will continue to be used more extensively for car bodies and parts.

Air conditioning of automobiles is a new factor that may be of tremendous import to the metal industries. Nash has made a start in this direction, and the extended use of small air conditioning units for the home, the railroad coach, and the bus will give an added impetus to this development. The unit type of construction, in which Lincoln-Zephyr has pioneered, may be generally adopted by the industry. Regarding the outlook for the rear-engine car, and the use of the Diesel engine, no definite information is at hand. A present and probable future trend is the elimination, at some points in the car, of the need for lubricants, or a decrease in the frequency of lubrication required, perhaps by the use of powdered metal

Tack ragging and inspecting Pontiac sheet metal after leaving preparatory washes and before entering the Bonderizing spray booth.

bearings, high lead mixtures and graphite containing materials. The numerous applications of zinc alloy die castings have already been given. Due to their fine appearance, ease of fabrication, durability, uniformity, and low cost, they are expected to occupy a position of even greater importance in the automotive industry.

Health Hazards in the Plating Industry

The many causes of injury and how to prevent them. Clean, safe and healthy places to work result in higher efficiency, lower production costs and reduced insurance rates.*

A Report from the
CLEVELAND BRANCH
American Electro-Platers' Society

THE purpose of this paper is three-fold.

First: Promoting the health and efficiency of the employee.

Second: Calling attention to the economic and legal aspects arising from suits brought about through injuries.

Third: To create on the convention floor discussion that may bring out many points covered by the material presented.

Up to last year, all but two States had passed Workmen's Compensation Acts, of these only 17 grant compensation for occupational diseases. The early acts were concerned with awarding compensation for accidental injury while the importance of occupational diseases were largely ignored. There is, however, constant pressure being exerted to increase the employers' responsibility in this direction as is indicated by the constantly growing number of law suits instituted in behalf of the vtciims in our common law courts, and the magnitude of the generous verdicts awarded by juries in recent cases.

With the changing industrial and social pattern, it is imperative that the needs of labor be met in this respect.

Silicosis

Silicosis is perhaps the outstanding problem of this industry, and since it has been included in the compensable diseases, its importance can not be ignored. This is especially true in the polishing and buffing departments. While silicosis denotes the specific disease resulting from the inhalation of silica dust (SiO_2), it is also applied in a broad, general way to a number of varieties of the disease contracted by inhaling particles of insoluble matter which lodge in the lungs. For the purpose of this paper, the term silicosis will apply to such pulmonary ailments as are the result of the inhalation of inert dust, attendant with the common operation of metal-finishing.

About 15% of all workers in industry are exposed to dust hazards which have deleterious effects on the respiratory system, their danger varying from mild irritation to silocosis and active tuberculosis.

Silicosis is characterized anatomically, by a generalized fibrosis of the lung and clinically, by shortness of breath, decreased chest expansion and a lessened capacity for work out ot proportion to the objective physical findings.

It is often slow in development, hard to recognize until well developed, and frequently when clearly diagnosed, for all practical purposes, incurable. Therefore, it is extremely important to realize that the only certain remedy is *prevention*.

The first essential step in this direction is, of course, the provision of an adequate exhaust system to carry out the dust before it reaches the men. The second step would be to carry on the work in such a manner that no unnecessary dust is produced. Prevention should be extended to include periodic examination of the employee in order that no unfit person be kept under this hazard.

Cleaning

Under this heading, we wish to call attention to the irritation that frequently occurs when the operator on the cleaning tank makes it a practice to work with his sleeves rolled up exposing his forearm. The heated vapor arising from the cleaning vats serves to open the pores of the skin allowing the irritant alkaline particles carried over in the vapor to inflame the skin and pave the way for greater harm. When the operator is so unfortunate as to possess a tender skin, much loss of time can arise from this cause. The obvious remedy is to see that the tank worker keeps his sleeves rolled down regardless of the slight inconvenience this may occasion.

In addition to skin irritations, when freshly-made cleaners are put into operation, it sometimes occurs that the cleaner does not contain any soap compound and that the material cleaned is free from grease which would assist in producing a soap. Applying heat to a cleaner under these conditions, plus the agitation due to electrolysis causes minute particles of alkali to be carried over in the vapor, thus creating an alkali-laden atmosphere which is uncomfortably irritating. It has been found that the addition of a small amount of material such as beeswax or stearic acid to the cleaning vat will prevent the escape of alkali into the air.

Nickel

While the subject of nickel itch is as old as the history of nickel-plating itself, it is a matter of conjecture as

*From a paper read at the New York Convention of the A. E. S., June, 1937, by F. N. CARLSON; from the Monthly Review, August, 1937.

to which is the worst offender; the plating solution or the physical condition of the worker.

A term commonly heard today is that a person is "allergic," that is, he is susceptible to certain outside conditions which serve to set up a discord within his system. This sensitivity to the influence of the material to which he is allergic, is as much to blame for the trouble as the material itself or the conditions under which he works.

It has been noted that when a worker suffering from nickel itch has been transferred to other jobs, the ailment disappears rapidly.

In the treatment of this irritation, many of the ointments used in the lesser skin diseases are indicated. It should also be noted that such treatment as is indicated in cases of poison ivy will give relief.

Observing strict cleanliness while working around the nickel tank, will reduce this trouble to a minimum. If, after a case is cleared up, the worker again becomes a victim of it, the only common sense remedy is to transfer him to some other work away from all contact with nickel solutions.

It has been observed that the general resistance of all workers to the commoner ailments of the plating room is greatly increased when he makes it a practice to include in his diet much fresh fruit, such as oranges, apples, etc., as his budget will permit. It is a recognized fact that the fruit acids will go far in safeguarding us from the lesser complications of our profession.

Local discussion of this subject brought out the fact that some workers overcame their aversion to nickel and it was thought that this was due to the immunization through prolonged contact. It was proven, however, that the real cause was a correction of the man's internal condition through change of diet.

Chromium

One of the latest hazards to be met in the industry is in the operation of chromium baths. While this is not due to any direct toxic condition arising from the material, its extremely corrosive properties result in severe damage to the eye, nose and skin.

Chromic acid in the form of dry dust or as a spray from the plating operation may irritate the nasal tract to the extent of the formation of scabs and bleeding. Extreme cases of prolonged exposure have been known to result in the perforation of the septum or the division between the nostrils. Irritation may also occur within the eye, although ample warning is given the victim through his physical discomfort caused by the exposure. This may be readily relieved by bathing with water.

The effect of chromic acid on the normal skin is very slight, but its entrance into any abrasion or cut may lead to severe inflammation. In these cases prompt treatment at the time of contact will generally result in a minimum of irritation. If treatment is neglected, the sore bores into the surrounding tissue causing an ulcer with an accompanying hard top or scab. The application of a solution of sodium bisulphite will tend greatly to arrest this penetration through the neutralization of the chromium compound included in the wound. A compress of gauze saturated with this solution is the indicated method of treatment.

Adequate ventilation of the plating room will eliminate entirely the hazard from spray, and it is important that the plater observe this in making new installations. The use of vaseline is highly recommended in protecting the nasal tract from such spray as may escape. To protect the skin of the hands and arms, applications of lanolin or wool-fat will reduce the chances of injury from contact with solutions. Of course it is taken for granted that

Metal polishing, another "hazardous" occupation made safe by proper guards, and exhaust systems. (Courtesy, Lockwood Hardware Mfg. Co.)

the worker will be provided with rubber gloves and suitable means of protection from the solution and spray.

In handling the dry chromic acid when making up or replenishing a solution, the use of a respirator is recommended as here the worker comes in contact with the irritant in a highly concentrated form.

Lead Poisoning

Lead poisoning is an insiduous ailment and difficult to recognize it in its early stages. There are four types of work in industry that promote lead poisoning: lead burning, lead pot heat treating (above 1600 degrees F.), lead plating and paint making.

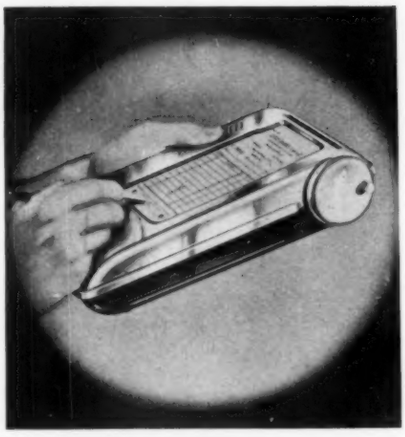
The first symptoms of lead poisoning will be a general run-down condition of the body, being more susceptible to colds, etc. This is accompanied by a loss of sleep, restlessness, nervousness, extreme irritableness, and constipation. The more advanced symptoms are black rings under the eyes, around the finger and toe nails, and around the gums at the base of the teeth. Sometimes small hard lumps appear on the body and back. These are accompanied in the later stages by severe cramps in the arms and legs lasting from several minutes to as long as an hour.

The only permanent help that can be given the patient is a complete outdoor life, with plenty of rest, sunshine and good food. One of the best preventives of lead poisoning is a clean, well-lighted and ventilated shop, where all dirt can be easily removed. The manager can not emphasize too strongly the value of the workers' personal hygiene. The worker must scrub his hands with a brush using plenty of creosote, soap and water, before eating. The worker must take a shower and change all clothes before leaving the plant. The worker must drink large quantities of milk and guard against constipation. The worker must remember that lead poisoning is an internal ailment caused by lead entering the body through the nose and mouth. The worker must get lots of sleep and fresh air. The worker must not drink intoxicating beverages under any circumstances. The worker must see his doctor if he begins to feel rundown. The worker must keep dust down to an absolute minimum by wetting the floor before sweeping. When dust can not be kept down the worker must wear a respirator.

Cyanide Hazards

We are all quite familiar with the old method of platers protecting their hands and arms with rags or canvas gloves when operating alkaline solution. An improvement over this method was found by supplying each man with rubber gloves, boots and aprons. The equipment was exchanged by the employees of each shift. This practice cut down cyanide burns to a great extent, but did not eliminate all of the trouble. A better method is to furnish each individual with his own equipment. In one instance, each new employee is supplied with a pair of rubber gloves, and the cost is taken out of his pay. However, as long as he continues to return an old pair, he receives a new pair in exchange, and no further charge is made. This encourages more careful usage of this equipment than if issued indiscriminately.

In working with cyanide, again cleanliness is the most essential thing to practice.



A "shining example" of a product of this "hazardous" industry, a chromium plated autographic register. (Courtesy, Standard Register Co.)

All drinking equipment should be so located as to preclude any contact with cyanide operations. A great potential danger exists where cyanide in any form is used in close proximity to acids or their solutions. The gases resulting from any chance mixture of the two are identical with the lethal material used in some States for executing criminals. The finality of its action should be sufficient evidence of the necessity for the isolation of these two chemicals.

Another source of trouble is the direct contact of cyanide or its solutions with the common wounds attendant with normal factory operations. In this respect, zinc cyanide solutions seem to be the greatest offenders due to their higher alkalinity, containing as they do both sodium cyanide and sodium hydroxide. Of course, copper, brass and cadmium are not to be forgotten.

The sores developed from contact with cyanide solutions are at first very insignificant in appearance, but soon advance to a stage where expert medical attention is advisable. A remedy that has worked well in one instance but that should be used only by a competent physician, consists of treatment with a 10% solution of carbolic acid. The first step in this treatment consists in the removal of the hard scab that covers the top of all neglected cyanide burns. The hole now exposed to view should be swabbed out with the 10% solution which will neutralize the cyanide and arrest further perforation. A subsequent washing with alcohol will neutralize the excess carbolic acid. Sores so treated should be kept clean and dry, and will heal very rapidly.

As in all other plating operations, ventilation of the cyanide tanks will do much to lessen the danger attendant with the inhalation of vapors carrying cyanide compounds. The attack from these fumes on the mucous membrane of the respiratory tract is somewhat similar to that resulting from the inhalation of vapors from the chromium plating operations.

Conclusions

It will be seen from the foregoing that a few general recommendations can be made which may be applied in common to all of the departments of this industry. In the order of their importance, they are:

First: Cleanliness or good housekeeping which is the result of instruction and the granting of ample time for its observance.

Second: Careful selection of workers as to their physical fitness and educating them in the proper handling of the materials with which they work.

Third: The problem of ventilation may be safely left to the many

authorities now making equipment for this purpose and *faithfully carrying out their recommendations.*

Fourth: Providing working conditions as comfortable as possible, thus reducing the hazard that often has its origin in fatigue.

Safe and comfortable working conditions are now considered to belong to the ABCs of operating efficiency by the country's more progressive, industrial concerns, and it is gratifying to note that in their recent labor disputes, little or no criticism was directed specifically against the general working conditions.

There are, however, a great many concerns who have failed to fully recognize their responsibilities to their employees, and it is to them we address this paper.

Discussion

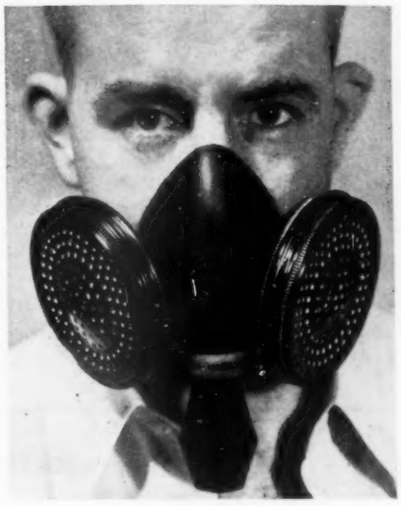
William Castell (Anderson Branch): I should like to know the general opinion about the hazards of solvents, and in particular, as to degreasing the use of gasoline.

F. N. Carlson: A clipping was handed to me yesterday by one of our members, calling attention to a discussion at a recent medical convention in New York on the effects of solvents used in cleaning in industry. It mentioned some disease that occurred from it.

D. M. Overcash (Syracuse, New York): I should like to know if any of you have noticed that brunettes are less susceptible to skin rashes than blondes. That has been our experience, but we have had outstanding exceptions.

D. Bloomfeld: That is an interesting thing, which I had never thought of before. Every light fellow I had in the department I had to let go, and now all my men are dark. I find that when you have sores, if you clean them out well and put powdered boric acid on them, they will heal very quickly, and there is no trouble. In fact, my men wash their hands in boric acid every night.

G. Hogaboom: One of the things that the speaker referred to was silicosis. I wonder whether this is being given the amount of real study it should have, and whether the opinion is that silica is the cause of most of the trouble. This may go as far as to eliminate silica compound-forming materials. When you are using any compound regardless of whether it is silica or whatever it may be, there are fine metallic particles, and the question arises whether it is not the metallic dust that enters into the bronchial tubes or the upper part of the lung that causes the trouble, rather than the silica. There was recently a case of what was designated as silicosis, and upon post-mortem examination it was found that a nut had settled down in the bronchial tubes of the man and had caused the trouble, and not silica. I am wondering whether the silica part is not being emphasized too much, and the metallic part forgotten, because when you polish you must remove some metallics and those metallics are very fine.



Protection against silicosis and chromium acid fumes. (Courtesy, Mine Safety Appliance Co.)

Your speaker spoke very well of lead poisoning, about polishing materials that contain lead, and how it can be caused through improper exhaust systems. The most important thing is to get a thorough exhaust system.

I do not know whether blondes or brunettes are more susceptible to the effects or hazards of the plating room, but I do know that in handling materials, such as silver vanity boxes, the girls who come from the southern European countries stain brass and silver much more readily when handling them than blondes do, and their perspiration will effect metals much more readily. I have known plants where you have to select girls so as to get away from the tarnishing of metals in packing.

Carl Huessner (Detroit): In regard to silica the insurance underwriters believe that the detrimental part of most of it is due to sand, because they have, in the last few years, practically rid the country of sand blasting, and a good many of the old type sand blasts may have had metallic particles coming out with the sand, as you have in the polishing room, but they still allow them to sand blast by not using sand. Good ventilation will practically eliminate the trouble, but the underwriters feel that the really detrimental effect of silica is sand and not metallic particles.

This paper comes at a time when it is rather interesting from another angle, and that is the American Standards Association has instigated work to be done on a National Health Code for the plating room, which is being guided by Dr. Bloomfeld of the Industrial Hygiene Department of the United States Department of Health. I might say that the representatives on this Committee are very much interested in getting all the information that is available. It is not like some of our other committees, such as our Bureau of Standards Committee on Research on Plating, because I believe the industrial field is a more simple one, and the national department is more familiar with manufacturing than some of the other government departments. Fortunately, we have Dr. Blum of the National Bureau of Standards on this Committee, and anyone who might have some suggestions on ventilation or suggestions on eliminating things from the plating room and polishing room that are going to work hardships, I think should communicate with Dr. Blum because a vast amount of information and proof is needed in order for that Committee to accomplish what is expected of it in the next year or so.

Mr. Hartshorn: Do you recommend individual ventilation for cyanide plating?

Carl Huessner: I think the question relates directly to cadmium and I think it is the general belief that cadmium is extremely toxic. Mr. Soderberg can probably tell us how toxic cadmium really is. If it is as toxic as reported probably you need ventilation on all cadmium tanks as a safeguard.

Mr. Soderberg: That question comes

up rather frequently. I have this general impression that cadmium solutions are not the cause of trouble in the industry. The causes of trouble occasionally are the fumes of cadmium or cadmium oxide.

The first point is the efficiency of the bath. The higher the efficiency, the less spray you have. The second is the surface tension of that bath. If you have organic substances which give you fine bubbles and the tendency to blanket formation, you will have very little material getting into the air there. I believe it is well to add some of these new wetting agents, even soaps, to tanks with rather low efficiency and where there is quite a little gas evolution.

Walter Meyer: Pneumoconiosis is a generic term for those types of lung diseases. It is the very fine particles that cause the trouble, because the large particles do not get in through the very fine tissues where the lungs split up into the very fine tubes. Of course, silicosis can be contracted by breathing in large quantities of felt or hair. In the breakdown of some products a deposit of silica is left and considerable quantities of silica can be absorbed in that way.

I think there is a rather interesting test that should be brought to your attention in the study of dermatitis. There is a spot test, if you believe a person has an allergic tendency to some chemical. The usual procedure is to form a little pad or take a little bit of material and put it on one of the tender portions of the body, for instance, under the arm, for twenty-four hours, and if the person is hypersensitive to that chemical he will be broken out very strongly in that portion of the body where he was exposed to that particular chemical.

The toxicity of solvents should be studied and brought to the attention of the Electro-Platers' Society more than it has. Do not be fooled by the sweet smell of many solvents in the lacquer industry, because in the metabolism in the body some of these compounds break up into harmful compounds and cause cirrhosis of the liver. The particular harm in solvents such as carbontetrachloride, benzene or toluol (benzene is the worst) is due in a great measure to destruction of red corpuscles. In general, I think we can say that women are much more susceptible to any type of poisoning in the plating industry or chemical industry than men, and we should watch the health of women operators very carefully.

Another factor is that we should not always wait for definite pathological symptoms to show up in a person, because that is like locking the barn after the horse is stolen. What we should do is to make more careful and periodic examinations of the workers. I have in mind lead poisoning and mercury poisoning. One of the best methods of examination, and it is now being done, is to make a spectographic analysis of the urine.

Carl Huessner: In regard to cadmium rash, I know of one plant which plates a good many small items, such as tacks. These were put in the mouth, and they used to have "inspection rash" in that plant, but they found that the use of minute quantities of nitric acid in the rinse would eliminate it. I think, in general, there are very, very few people sensitive or supersensitive to cadmium, because if you will go through the industry you will find thousands of operators carrying cadmium-plated tacks and cadmium-plated studs in their mouths every day, and if there was very much sensitiveness to it, they would not be able to do that. In fact, some people claim that it is almost as safe as some of the precious metals.

Mr. Soderberg: The radio industry has a big assembly on cadmium. You can see hundreds and hundreds of girls sitting at long tables assembling cadmium-plated parts. Cadmium is not a problem in that industry on the assembly line. I believe in this particular case that was mentioned it was an individual sensitiveness.

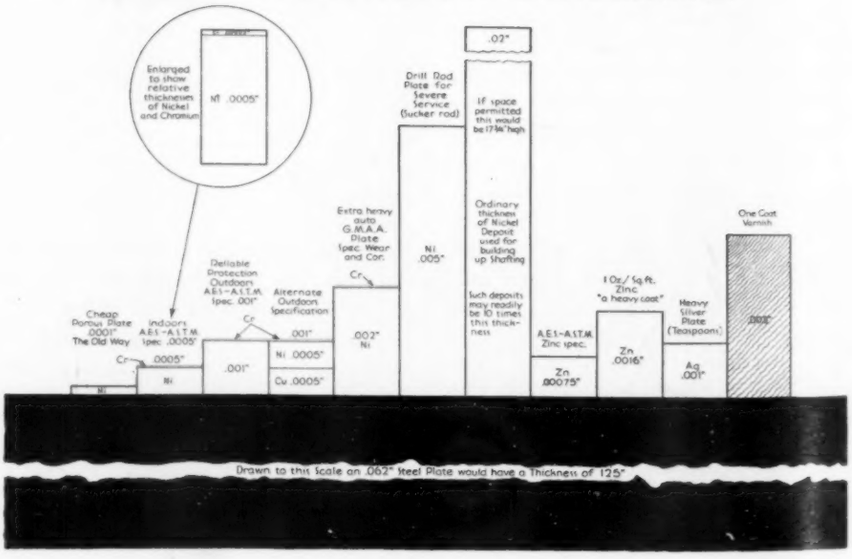
Hot Lead Dip

Q.—Can you give me any information as to a method of lead coating copper stripping and red brass castings by dipping in molten lead.

A.—The work should be pickled first. This is done by dipping into a 1-10 solution of sulphuric acid and brightened by dipping in mixed nitric and sulphuric acid.

The article is then rinsed in clean warm water; dried; dipped in a solution of zinc chloride; dried and dipped in your lead bath. Shake until all the lose metal is off, similar to galvanizing. You may use a little palm oil to clear the metal, or rosin. This should give you satisfactory results.

—W. J. Reardon.


RELATIVE THICKNESSES OF PROTECTIVE COATINGS
Enlarged to show relative thicknesses of Nickel and Chromium
Ni .0005"
Cheap Porous Plate .0001" The Old Way
Cr .0005"
Ni
Indoors A.E.S.-A.S.T.M. Spec. .0005"
Reliable Protection Outdoors A.E.S.-A.S.T.M. Spec. .001"
Cr
.001"
Alternate Outdoor Specification
.001"
Ni .0005"
Cu .0005"
Extra heavy auto G.M.A.A. Plate Spec. Wear and Cor.
Cr
.002" Ni
Drill Rod Plate for Severe Service (Tucker rod)
Ni .005"
.02"
If space permitted this would be 17/64" high
Ordinary thickness of Nickel Deposit used for building up Shafting
Such deposits may readily be 10 times this thickness
A.E.S.-A.S.T.M. Zinc spec.
Zn .00075"
1 Oz./Sq.ft. Zinc "a heavy coat"
Zn .0016"
Heavy Silver Plate (Teaspoons)
Ag .001"
One Coat Varnish
.0002"
Drawn to this scale on .062" steel Plate would have a Thickness of .125"

An interesting and instructive graphic representation, comparing the thicknesses of commercial coatings of various materials, for protective ad decorative purposes. (Courtesy, International Nickel Co.)

Determination of Tartrate in Cyanide Copper Plating Solutions

Copper plating with Rochelle salt facilitated by a simplified method of analysis for controlling the solution.

By **Dr. LOUIS WEISBERG**

Louis Weisberg, Inc., New York, N. Y.

THE use of tartrate in cyanide copper plating solutions has become standard practice in a considerable number of plants. This is particularly so in plants where large quantities of zinc die castings are copper plated prior to nickel and chromium plating. Tartrate is most frequently employed for this purpose in the form of Rochelle salt, which is potassium sodium tartrate.

Tartrates are a useful addition to cyanide copper solutions for several reasons. They improve anode corrosion and prevent the accumulation of insoluble deposits on the anodes, especially when the solution contains little free cyanide. At the cathode, tartrates help to produce smooth, fine-grained deposits which, although not bright, serve as an excellent foundation for bright nickel. A further advantage of tartrates is the fact that their use makes it possible to employ higher current densities than is practicable, otherwise, in cyanide copper solutions.

In spite of the considerable use of Rochelle salt in cyanide copper plating, a quick and reliable method for determining tartrate in these solutions has not been available. The difficulty attending the determination of Rochelle salt in these solutions may be realized from the fact that some chemists have preferred to determine the potassium rather than the tartrate. Obviously, either determination can be used as a basis for calculating the Rochelle salt content. The lack of a good control method might have proved a more serious drawback to the use of Rochelle salt than it has, had it not been for the fact that the concentration of Rochelle salt can vary within wide limits without causing trouble. Nevertheless, where the copper is used as a foundation for bright nickel, it is desirable to keep the composition of the solution near that at which the smoothest deposits are obtained. This requires regular analytical control, which is easy only if a fairly simple and short method is available.

The procedure described below affords a fairly quick and reliable method. No great originality is claimed for it, as it is merely the result of trying out a number of methods proposed or used by others, modifying them in various details, and combining the best features of several. This procedure has been tried out in the writer's laboratory by checking it on a solution to which a known amount of Rochelle salt had been added, and also by using it for routine control of plating solutions.

The method is based on titration of the tartrate with a standard solution of potassium permanganate. Before the titration can be carried out, it is necessary to destroy the cyanide and take out the copper. The first is accomplished by boiling with hydrochloric acid, and the second by treating the solution with zinc dust or granulated zinc, and filtering.

Details of the Procedure

The best size of sample to take for analysis depends on the concentration of Rochelle salt in the solution. If the solution contains in the neighborhood of 4 ounces per gallon (30 grams per liter) or less, a convenient amount is 5 c.c. If the solution contains much more Rochelle salt, it is best to use a smaller sample.

The sample—5 c.c. or less, as the case may be—is measured in a pipette, and transferred to a small beaker or flask, where it is treated with 1 c.c. of concentrated hydrochloric acid. The mixture is next boiled, taking care that the volume does not fall below 2 c.c. This operation should be carried out in a hood to avoid inhaling the hydrocyanic acid which is evolved. Complete destruction of the cyanide is necessary. When this has taken place, the solution becomes clear and takes on the greenish color characteristic of copper chloride.

After the cyanide has been destroyed, the solution is diluted to about 50 c.c. with distilled water, and about a gram of zinc dust or granulated zinc is added. On shaking the solution with the zinc, the copper is all precipitated. The solution is next filtered through a filter paper, and the precipitate thoroughly washed with distilled water. At this stage, the solution should be colorless and clear. Five c.c. of concentrated sulphuric acid and several crystals of manganous sulphate (about one gram in all) are added to the combined filtrate and washings, and the whole heated almost to boiling. When the solution has reached the proper temperature, and the crystals have dissolved, tenth normal potassium permanganate solution is run in from a burette, with stirring, until an excess of a few c.c. has been added. The solution at this point shows a brownish turbidity due to the presence of precipitated manganese dioxide. Next, the solution is cleared by adding 5 or 10 c.c. of tenth normal oxalic acid, and heating almost to boiling once more. More permanganate solution is added until the pink color which appears on the addition of each drop persists for at least one minute.

One c.c. of tenth normal potassium permanganate is equivalent to 0.0047 gram (0.00063 ounce) of Rochelle salt. The amount of Rochelle salt in the solution is calculated from the

difference between the total amount of tenth normal potassium permanganate solution and the amount of tenth normal oxalic acid used. For a 5 c.c. sample, this difference, when multiplied by 0.94, gives the result in grams per liter, or by 0.125 in ounces per gallon.

This method for determining tartrate in cyanide copper plating solutions gives reproducible results, and is accurate enough for control purposes. It requires a shorter time than any other method that has come to my attention.

Acknowledgment of indebtedness is made to *Lawrence Greenspan*, who carried out the experimental work that was necessary in connection with the development of this method.

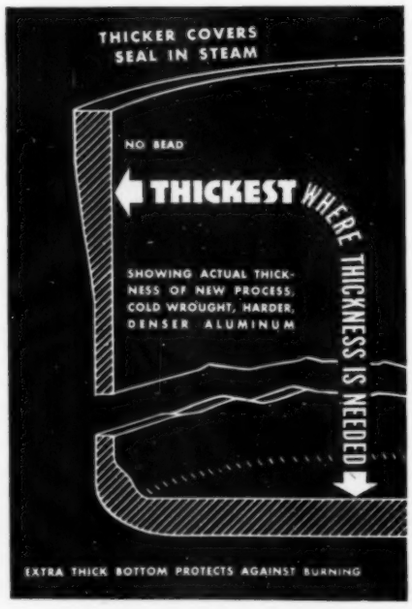
Metals and Metal Finishes in Hotel Equipment

By **M. W. SCHWARZ**
Chemical Engineer

THE twenty-second National Hotel Exposition was held at Grand Central Palace, New York City, November 15-19, 1937. Included in the widely diversified field of exhibits were a number of products employing metals, alloys and metal finishes in their construction. Kitchen utensils, laundry and dishwashing machines, stoves, cutters for meat and butter, beer dispensing systems, refrigerating machinery, adding machines and cash registers, occupy a prominent position in the group of metal products exhibited. The utensils and fixtures used in the kitchens of hotels and restaurants are characterized by a rugged construction. Much of the equipment is built of corrosion-resistant materials.

The *Aluminum Cooking Utensil Company*, New Kensington, Pa., has developed a new method of fabrication for utensils with heavy bottoms, which were formerly made by welding. In the improved process, a double-thickness bottom and double-thickness top rim, with single-thickness side, are obtained by deep drawing. There are no seams in the utensil, and the drawing increases the hardness of the metal. Another product exhibited by this concern was a candy kettle of hard aluminum alloy, coated by the Alumilite process. This is a new application of both the alloy and the coating.

A new type of steamware, "Gla SSave," was displayed by *Nathan Straus-Duparquet, Inc.*, New York City. This product is made in two separable parts:—a clip holder, stem and base, made of 18% nickel silver, electroplated with silver, and a crystal bowl inset. This construction eliminates breakage of the stem and base, and permits economical and easy replacement of the glass top, in the event of breakage. *Standard Butter Cutter Company*, New York City, has reduced the possibility of corrosion to a minimum by the use of a sand cast aluminum base, Monel metal racks and Duralumin knurled adjusting knob. Wires are made of high tensile strength tool steel, electroplated with tin. This same attention to detail and good judgment in the selection of materials have been used by *The Biro Manufacturing Company*, Marblehead, Ohio. Their meat, fish and bone cutter employs 18-8 corrosion resistant metal or enamel for all surfaces coming in contact with meat; the upright is cast of Tenual aluminum alloy and guides are made of nickel silver. *York Ice Machinery Corporation*, York, Pa., now rustproofs the steel walls of evaporative condensers by Bonderizing, and finishes them with a baked coat of Duco. Scaling is eliminated in the water coolers of their large Freon air conditioning installations, by the use of Muntz metal tubes. The *Hartford Steel Ball Company*, Hartford, Conn., offers an improved product for burnishing and polishing silverware, for use in hotel and restaurant kitchens, and in industrial plants. Due to the absence of rust, it is stated, scratching of silverware is eliminated, the ball and pin mixture has a longer life, and less time is required for polishing.


THICKER COVERS SEAL IN STEAM
NO BEAD
THICKEST
WHERE THICKNESS IS NEEDED
SHOWING ACTUAL THICKNESS OF NEW PROCESS, COLD WROUGHT, HARDER, DENSER ALUMINUM
EXTRA THICK BOTTOM PROTECTS AGAINST BURNING

Special method of construction used for aluminum utensils with heavy bottoms. (*Courtesy, Aluminum Co. of America*)

The products of the exhibitors listed below, require metals, alloys and metal finishes in their fabrication.

Buffing of Brass*

Brass should be buffed on a closely stitched buff wheel, using a suitable compound as the cutting down agent. It should then be colored on a soft buff, using the desired coloring agent. The coloring operation should be done before the grease from the cutting down operation has had time to harden. A small amount of whiting sprinkled over the parts before the coloring operation enables the buffer to handle the piece without leaving finger marks.

Polishing Malleable and Grey Iron*

Castings such as lamp bases can be polished in two operations: roughing with No. 80 and greasing with No. 120 or No. 150.

Castings of a plane or flat surface to be nickel or chromium plated require at least four operations. No. 60 or No. 70 abrasive grain should be used for roughing, No. 120 for dry fining, No. 180 for first greasing and No. 220 for second greasing or finishing.

* From Facts About Metal Polishing. Norton Co.

A Study of the Rochelle Salt-Copper Cyanide Plating Bath

Part II. Effect of current density and pH on anode behavior.*

By A. KENNETH GRAHAM[1] and HAROLD J. READ[2]

AN OUTSTANDING advantage of the Rochelle salt-copper bath is the ability to use high current densities at reasonably high current efficiencies to insure rapid deposition of heavy copper deposits. In attempting to do this the anode current density is frequently disregarded. Experience has shown that the anode area must be sufficiently large to prevent excessive polarization resulting from anode current densities in excess of safe limiting values. The object of Part II of this paper is to establish the limiting anode current values for various bath compositions and in addition to determine the effect of the pH of the bath upon the anode behavior.

Experimental Procedure

Several gallons of the various bath compositions (Table II) were prepared using commercial chemicals. One and one-half liter portions, adjusted to the desired pH, were then placed in two liter beakers for each run. Anodes consisted of one-quarter inch copper rods immersed to a depth of three and three-quarters inches. Cathodes consisted of sheet copper of ample area bent to snugly fit the side of the beaker. The anode was placed in the center equidistant from the cathode at all points, thus insuring a uniform anode current density. The entire assembly was placed in a water bath and a temperature of 55°C (131°F) ± 1°C was maintained by a thermal regulator.

At the start of each run the cleaned electrodes were placed in the bath and static potentials were measured in the usual manner using a saturated calomel half cell of a type previously described by one of the authors[3]. A low current density was then applied and the dynamic potential was measured. From this the anode polarization was obtained in the usual manner. Sufficient time was allowed to insure equilibrium values of potential. After each potential measurement the current density was increased by suitable increments and the corresponding anode polarization was again observed. In this way the variation of the polarization of a copper anode with current density was obtained. The results for the various conditions employed in this investigation are recorded graphically in Figures 3 to 7.

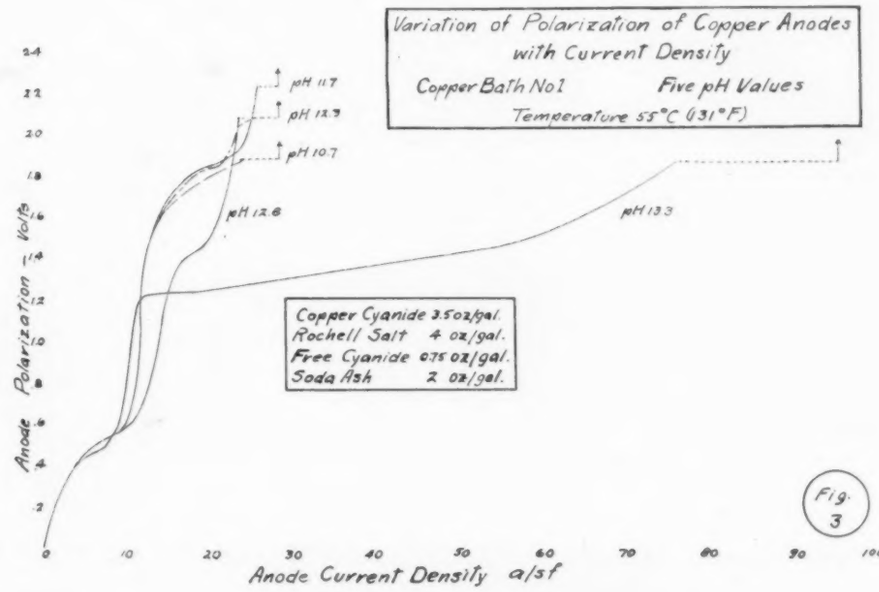
Discussion of Results

Effect of pH Variation

Figure 3 shows the variation of the anode polarization with the anode current density at five values of pH. A Rochelle salt-copper bath of composition No. 1 (Table II) was used. At pH values of 10.7, 11.7, 12.3 and 12.8 the curves are practically identical. The horizontal dotted portion with the arrow pointing upward at the top of each curve indicates the anode current density range within which the anode polarization became excessive. At such points the anode was badly coated, the bath voltage rose suddenly to a prohibitive value and the current decreased very appreciably. The limiting anode current density for all of the above pH values is about 24 amperes per square foot.

Upon increasing the pH to 13.3, by adding sodium hydroxide to a bath of similar composition, the tendency to excessively polarize does not occur until the anode current density exceeds 76 amperes per square foot. An explanation of this behavior was obtained when the anode efficiency was found to be about 1.5 per cent. At this pH, therefore, a copper anode behaves like an insoluble anode and therefore does not polarize until a high current density is applied.

These results would indicate that at practical pH values the anode current density should not exceed 24 amperes



[1]Consultant: A. Kenneth Graham and Associates, Jenkintown, Pa.

[2]Present address: John Harrison Laboratory of Chemistry, University of Pennsylvania, Philadelphia, Pa.

*Part 1 was published in our November Issue, p. 559-61.

[3]Graham, Trans. Electrochem. Soc. Vol. 52, p. 157 (1927.)

per square foot, using a composition such as bath No. 1 (Table II) and a temperature of 131°F.

Effect of Variation in Bath Composition

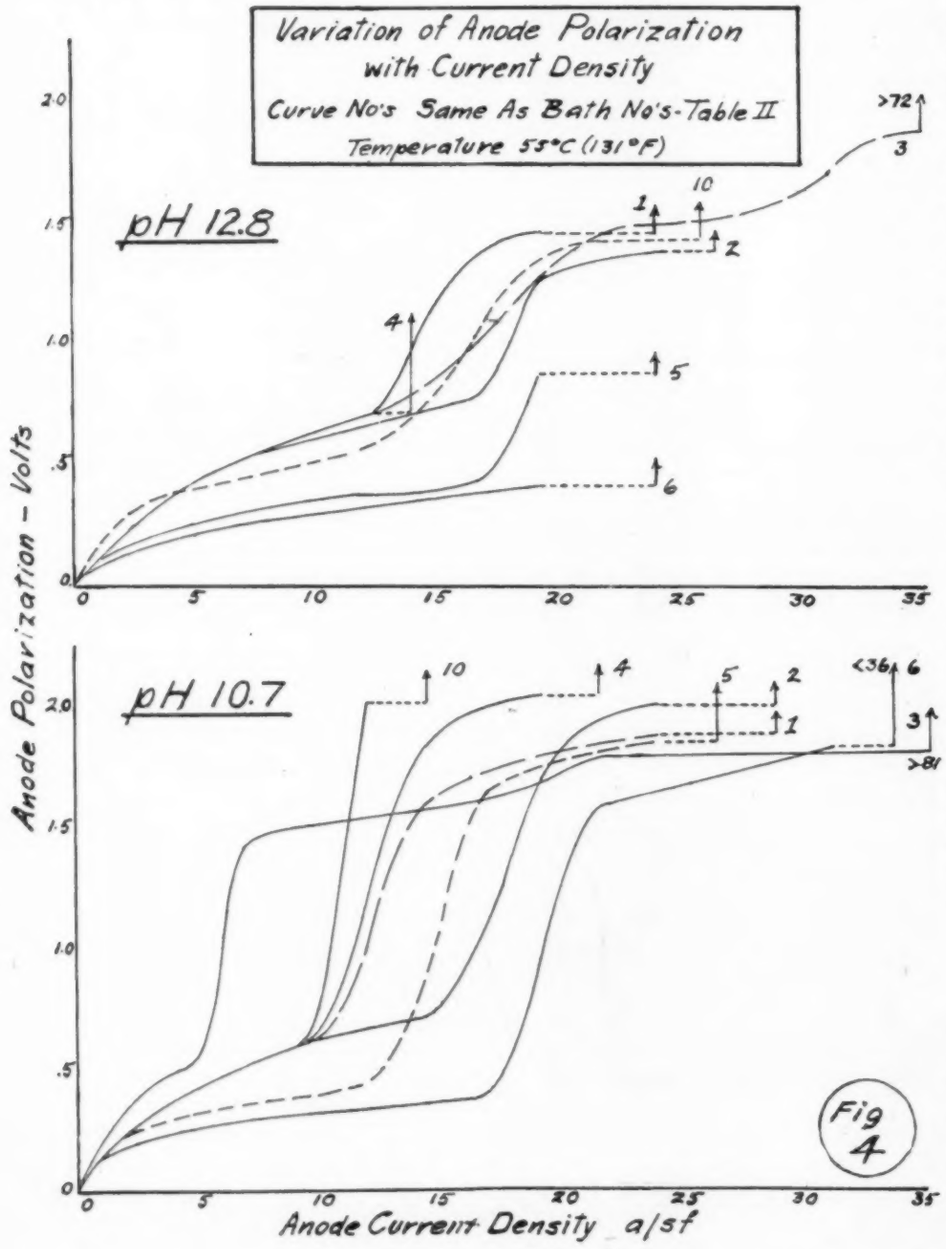
In Figure 4 the anode polarization vs. current density curves for the various solution compositions mentioned in Table II are shown. pH values of 12.8 and 10.7 were investigated. The numbers on the curves refer to the bath compositions in the table.

TABLE II. *Bath Compositions Studied*

Bath No.	CuCn oz./gal.	Free NaCN oz./gal.	Rochelle salts oz./gal.	Soda ash oz./gal.	Variable
1	3.5	0.75	4	2	Reference bath
2	3.5	2.0	4	2	Higher free cyanide
3	3.5	0.75	4	9	Higher carbonate
4	4.0	1.6	..	2	No tartrate
5	5.5	0.75	4	2	Higher metal
6	7.0	0.75	4	2	Still higher metal
7	3.5	0.75	8	2	Higher tartrate
8	3.5	0.75	8	9	High tartrate and carbonate
9	7.0	0.75	8	2	High metal and tartrate
10	3.5	0.75	4	0	No carbonate
11	3.5	0.75	8	0	High tartrate, no carbonate

pH 12.8

Comparing the curves at pH 12.8 it is interesting to note that Nos. 1, 5, and 6 refer to Rochelle salt baths containing 0.75 ounces per gallon of free cyanide and 3.5, 5.5 and 7.0 ounces per gallon of copper cyanide respectively. As the metal concentration is increased, the limiting current density is practically the same at something greater than 19 amperes per square foot, but less than 23 amperes per square foot. The only difference in the curves is that the polarization jump, as indicated by the arrow, occurs at lower voltages in the more concentrated baths.



Curve 2 is for a bath containing 2.0 ounces per gallon of free cyanide. The polarization jump occurs at about the same voltage as Bath 1, but the limiting anode current density is raised to about 24 amperes per square foot.

Curve 3 is for Bath 3 containing 9 ounces per gallon of soda ash. The limiting anode current density is raised to something over 72 amperes per square foot before excessive polarization of the copper anode occurs. This would indicate a value in having high carbonates where high current densities are employed, although other factors must be considered before making such a recommendation.

Curve 10 is for a bath containing no carbonates. The limiting anode current density is about the same for Bath 1 (curve 1) containing 2 ounces per gallon of carbonate.

Curve 4 is for the conventional cyanide copper bath containing no Rochelle salts, 2 ounces per gallon of carbonate, and 1.6 ounces per gallon of free cyanide. The limiting anode current density is very low—about 12 amperes per square foot.

pH 10.7

At a pH of 10.7 the effect of increasing metal concentration on the polarization is much less marked as curves 1, 5, and 6 show. The limiting current densities are about 25 amperes per square foot except for Bath 6 which excessively polarized between 31 and 36 amperes per square foot.

Bath 3 (curve 3) containing high

carbonate again failed to polarize the anode at high current densities—under 81.6 amperes per square foot.

Bath 4 (curve 4), an ordinary cyanide composition, is again inferior to the tartrate baths containing carbonate.

Bath 10 (curve 10), containing 4 ounces per gallon of Rochelle salts, but no carbonate, polarized a copper anode excessively above a current density of about 12 amperes per square foot. This is a very strong argument in favor of adding carbonate to a Rochelle salt bath. The anode performance in the bath at both 10.7 and 12.8 pH is further discussed in connection with Figure 5.

To more clearly show the effect of specific bath constituents, other curves have been drawn using, for the most part, the same data as above.

Effect of Carbonate

In Figure 5, the upper set of curves are for baths containing 4 ounces per gallon of Rochelle salt and the lower set for baths containing 8 ounces per gallon. The solid lines in each case are for a pH of about 10.5, while the broken lines are for a pH of 12.5. The numbers on the curves correspond to the bath composition numbers in Table II. The ounces per gallon written on the several curves refer to the concentration of soda ash which is the variable under comparison.

Referring to the upper set of curves, the most striking features are curves No. 10 at 10.7 and 12.8 pH. These baths contain 4 ounces per gallon of Rochelle salt, but no added carbonate. At both pH values, the anode polarizes at a lower anode current density than when carbonate is present in the bath. The 9 ounces per gallon carbonate bath No. 3 gives curves at the two pH values that indicate very high limiting anode current densities without excessive anode polarization.

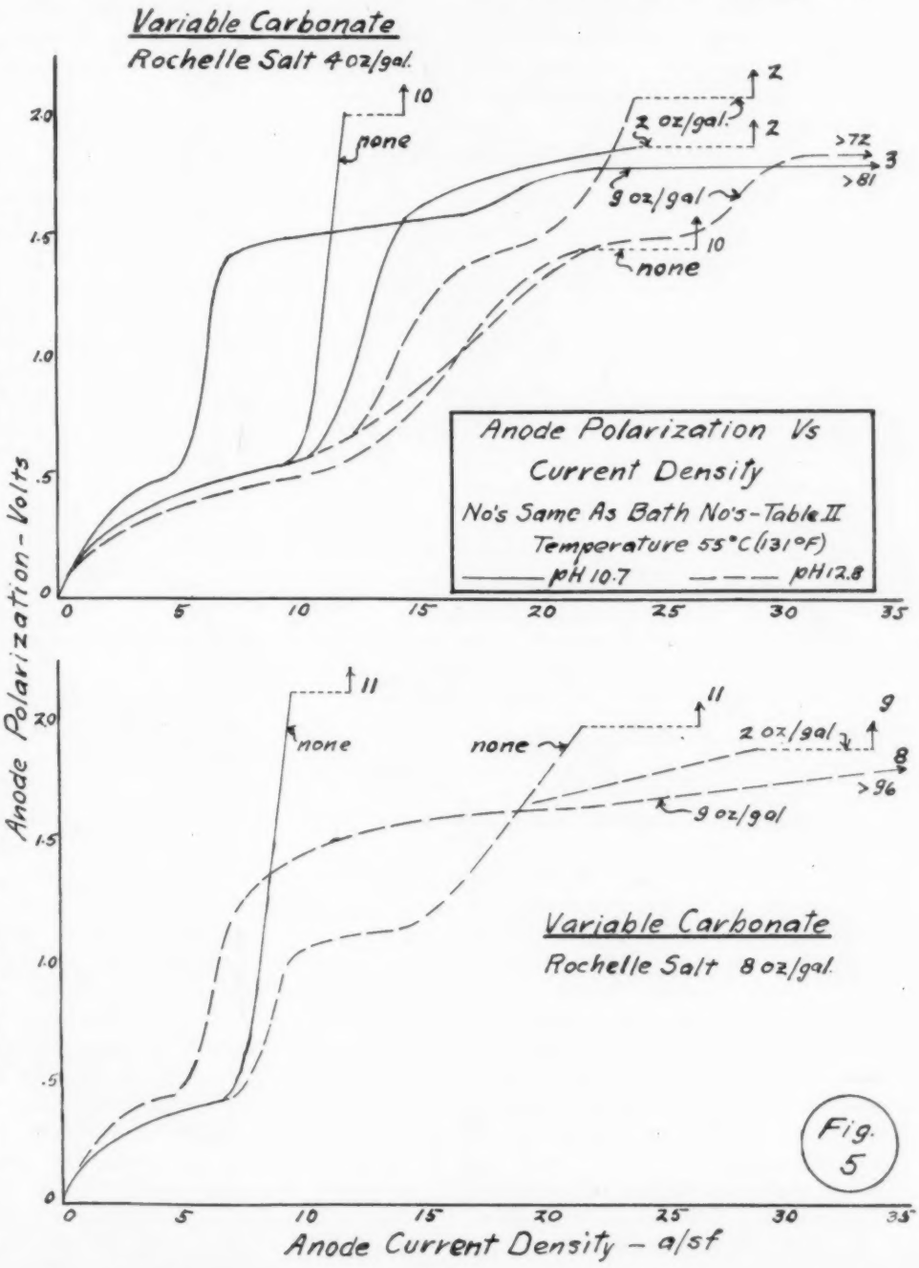
The lower set of curves for 8 ounces per gallon Rochelle salt baths show the same behavior. The only effect of the extra Rochelle salt is to raise still further the limiting anode current density for baths containing carbonates. The carbonate free baths are not affected by the higher concentration of tartrate.

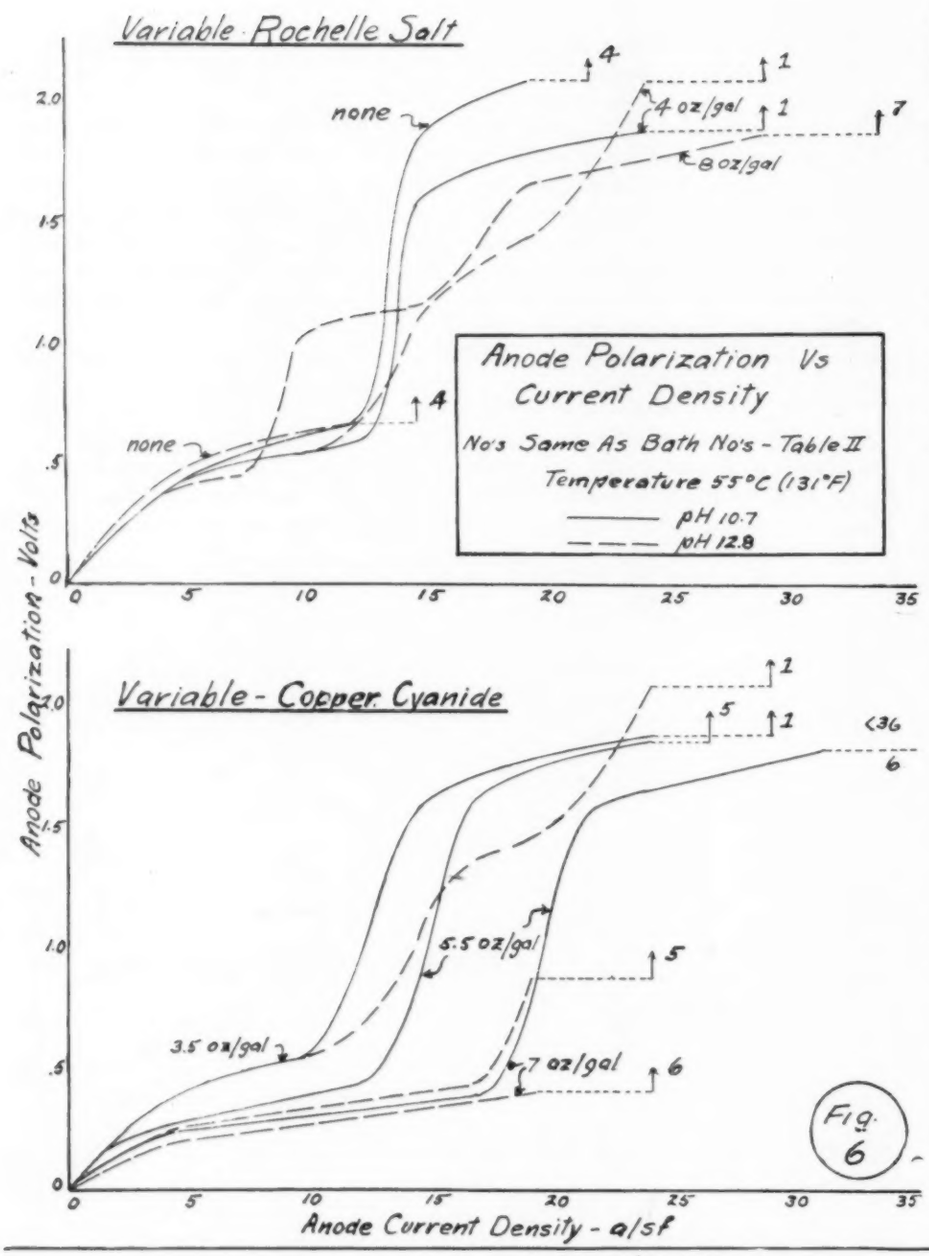
Effect of Rochelle Salts and Copper Cyanide Concentrations

In Figure 6, (p. 620) the upper set of curves refers to baths with varying concentrations of Rochelle salts. The lower set of curves refers to the metal cyanide concentration. Curve numbers and bath numbers correspond as before. The ounces per gallon refer to the variable under consideration. Solid lines represent a pH of 10.7, and broken lines a pH of 12.8. As usual, the horizontal dashed line terminating in an arrow pointing upwards indicates the current density range within which excessive polarization occurs.

Referring to the upper set of curves, it may be seen that as the Rochelle salt concentration is increased for any one pH value, the limiting anode current density is raised. There is little difference between the curves at pH 10.7 and 12.8 for the baths containing Rochelle salts. The Rochelle salt free bath has higher free cyanide (see Bath 4, Table II), but in spite of this it polarizes the anode at lower current densities. The limiting current density at 12.8 pH is about 12 amperes per square foot as compared with 19 amperes per square foot for the same bath at 10.7 pH.

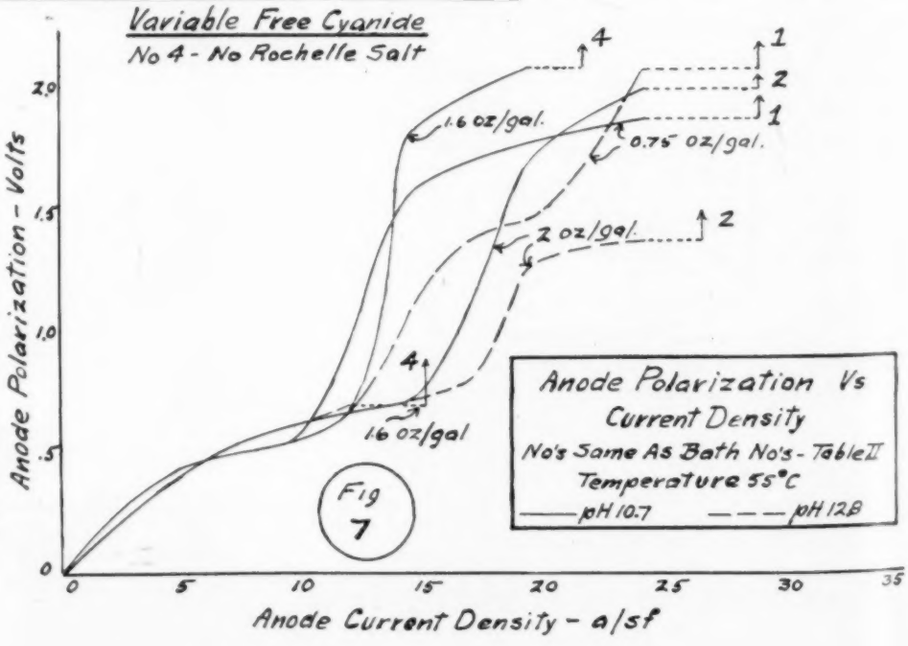
In conclusion one may say that the amount of Rochelle salts is not critical and the results obtained with 4 and 8 ounces per gallon are quite similar. Furthermore, the presence of the Rochelle salt counteracts the effect of pH on a Rochelle salt free bath in so far





as anode polarization and current density are concerned.

The lower set of curves in Figure 6 shows very clearly the effect of varying the copper cyanide concentration in baths constant with respect to Rochelle salt (4 ounces per gallon), free cyanide (0.75 ounces per gallon) and carbonate (2.0 ounces per gallon). The limiting anode current density for Bath 1 is about 24 amperes per square foot at both 10.7 and 12.8 pH. The higher metal baths, numbers 5 and 6, have slightly lower limiting anode-current densities at 12.8 pH and at 10.7 pH slightly higher values. One would conclude that the voltage at which the anodes polarize decreases at 12.8 pH as the metal concentration increases.



At 10.7 pH the polarizing voltage is practically independent of metal concentration. Furthermore, the effect of a change in metal concentration on the limiting anode current density is very slight at either pH.

Effect of Free Cyanide

The curves in Figure 7 are to be interpreted in the same manner as in the previous figures. It should be noted that for those baths containing Rochelle salt (1 and 2) the limiting anode current density is about 24 amperes per square foot independent of pH and of free cyanide between the limits of 0.75 to 2.0 ounces per gallon. Bath 4, containing no Rochelle salts, by comparison has a different limiting anode current density at the two pH values and both are lower than with baths 1 and 2 which contain Rochelle salt.

Summary

Both the anode current density and bath pH influence the tendency for copper anodes to polarize excessively.

The presence of tartrates does not overcome this tendency, although the allowable anode current density is raised when carbonates are also present.

High carbonates in Rochelle salt-copper baths permit high anode current densities without excessively polarizing the anode.

The free cyanide concentration has little effect on the polarization current density relationship.

Variation in metal concentration has little effect on the limiting anode cur-

rent density. With high metal (7 ounces per gallon CuCN), however, the anode current density can be higher at a pH of 10.7 without excessive polarization than at a pH of 12.8.

At a pH value 13.3 the copper anode acts like an insoluble anode. Under these conditions the allowable current density may be quite high in a Rochelle salt bath containing carbonate, but the anode efficiency is almost zero.

Conclusions

High current densities can only be used successfully in the Rochelle salt-copper bath provided the anode current density is controlled below certain limiting values. The anode area should be as large as possible. Adding excess caustic soda cannot be recommended because of loss in anode efficiency. High carbonate concentration (about 8 ounces per gallon) increases the allowable anode current density. A Rochelle salt concentration between 4 and 8 oz./gal. is satisfactory.

Part III of this study which follows deals with the effect of insoluble anodes.

Corrosion Testing

THE editorial published in METAL INDUSTRY for September, page 433, on Corrosion Testing has drawn forth some interesting information from several metallurgists engaged in this type of work.

It has been pointed out that our editorial might have created the misleading impression that tensile property measurements, used as a means of evaluating corrosion losses were new, beginning with the work of *Crampton* and *Mitchell*, as reported at the recent meeting of the American Society for Testing Materials, held in New York, June 28-July 2, 1937, although the authors, of course, made no such statement and did not intend to convey any such impression. The fact is that Committee B-3 of the A.S.T.M. has used this method of evaluating corrosion in outdoor exposure tests which have been in progress for over six years. Also the laboratories of the Aluminum Company of America have been using this method for a great many years. The first description of this test which has been brought to our attention was that by *Dr. Earl Blough*, at that time Technical Director for the Aluminum Company of America, in his paper "Evaluation of Corrosion Tests", Proceedings A.S.T.M., Volume 25, Part 2, page 156, 1925.

Of considerable interest are the methods used for evaluating corrosion losses by tensile property measurements by *D. K. Crampton* and *M. W. Mitchell* of the *Chase Brass and Copper Company*.

The specimens are strip tension test specimens 6 inches long and 0.032 inches in thickness. These specimens are drilled with a small hole at each end to permit placing in the water line or the alternate immersion apparatus. A group of about 50 specimens of each alloy used is prepared from sheet material which is rolled down in the mill. This group is annealed very carefully and the surfaces of the specimens are cleaned and finished with light emerying. From each group of 50 specimens, 5 are taken for determination of the original tensile properties. The averages of the original tensile properties must show standard deviations (root means square) of less than 1 per cent. The remainder of the group of about 50 specimens is used for the corrosion tests. Five check specimens are used for each metal-solution combination in the tests.

As explained in their paper, standard deviations of the average of the tensile property values of the corroded groups are determined and in comparing losses of tensile properties of several alloy groups, the standard deviation indicates how much spread between values is due to eccentricity or errors in testing. For instance, if Alloy No. 1 has a percentage loss of tensile properties after corrosion, of 3 with a standard deviation of 3, and Alloy No. 2 a loss of 1% with a standard deviation of 1%, the two alloys may be considered equal in corrosion resistance under the conditions of the test. If, however, Alloy No. 3 has a loss of 17% with a standard deviation of 3%, then Alloy No. 2 which has a loss of 1% with a standard deviation of 1% is definitely superior.

Loss of tensile properties as a measure of corrosion resistance is much more important and useful for nonferrous alloys than its use by people engaged in corrosion test work would indicate. This method is by no means new, but it is one which has not been accepted generally by the greater number of corrosion workers.

Exposition of Chemical Industries

Visit Metal Industry Booth 506 at the Exposition, Grand Central Palace, New York, December 6th-11th.

The 16th Exposition of Chemical Industries will be held at Grand Central Palace from December 6th to 11th inclusive, to function as an educational institution and a clearing house of information for the chemical industries. Products shown will include chemicals and plant equipment for the manufacture of all types; laboratory equipment and supplies for analysis, investigation and research; instruments for temperature and pressure measurement, regulation and control; metals and alloys, including platinum, gold, silver, rhodium, tantalum, tungsten, molybdenum, lead, tin, titanium, zirconium and their alloys, and products made of these metals and alloys; electrical equipment for use in chemical manufacturing plants, operation and control.

METAL INDUSTRY will be located at booth No. 506. Visitors are cordially invited.

In our next issue a report will appear describing all of the exhibits of interest to the manufacturers and finishers of metal products.

Vitreous or Porcelain Enameling

The detailed operations involved in this old art of beauty and utility.

By E. L. STINE

Ferro Enamel Corp., Cleveland, O.

The Base Metal

THE fundamental requirements of the base metal—steel—as far as chemical analysis is concerned are:

Low carbon and low metaloids.

Freedom from solid or gaseous impurities.

A minimum tendency to deform or warp under the enameling furnace temperature.

Good welding qualities.

Freedom from laminations, slag inclusions and gas pockets.

Good drawing qualities for stamped or spun wares.

In designing parts which are to be stamped in dies all sharp angles should be eliminated. The draft of the dies should be as great as possible so as not to strain the metal at points that will show up strain lines in the finished enamel.

All welded sections should be of the same thickness of metal.

Standard soft steel having the following composition is best suited for porcelain enameling:

Carbon	0.50 to 0.80 %
Phosphorus	0.030 to 0.090%
Manganese	0.040 to 0.060%
Sulphur	0.05 and under
Silica	0.01 and under

The Enamel

Porcelain enamels are melted mixtures of minerals, fused together at a temperature of 2500° F., applied and fired upon the metal base at a temperature of 1500 to 1600° F. so that they become a part thereof and will withstand impact, temperature changes, such as hot or cold water, hot sun or cold frost, resist acids and be fireproof; remain physically unchanged under all conditions. These enamels have the following composition; quartz or flint; feldspar, or sand, all of which produce hardness; then fluxes as soda ash, borax, saltpeter, fluorspar; next the opacifying agents: bone ash, barium, antimony, tin oxide, zinc oxide. Then, in the base coat especially, we add manganese, nickel, copper, iron and cobalt which act as adherence agents.

The base coat is the first to be applied to the sheet; upon it the cover coats are built, these being produced in any desired color or combination of colors by the addition of coloring pigments. All material used in enameling are inorganic.

Making the Frit

In the making of porcelain enamels the materials must be absolutely dry to avoid loss in the actual weights. They are measured out in balanced proportions, thoroughly mixed and charged into the melting furnace, (called "smelters"). The time required for liquifying is from 1 to 2½ hrs. depending on the kind and size of the batch. After a short while the mix will start to melt, the fluxes starting first. When the melt is completely "matured" it will stop bubbling (not boiling) the gases then being dissipated. A sample is taken, by sticking a rod into the molten mass and a quantity about the size of an orange is brought out and allowed to drip. It is taken in the fingers and pulled and pulled until it is too cool for further pulling. The string is inspected and if there are no "knots" in it, or grains of unsmelted material, then it is ready to withdraw from the smelter. The clay plug is broken away from the tap hole, the molten enamel allowed to flow out and into a tank of cold running water which shatters it to small pieces. This is now called "frit." The frit is shovelled out of the tank, or, if a wire basket is used, it is lifted out, allowed to drain and put into a dryer to evaporate all the water.

There is an estimated loss in the melting of 15 to 25% caused by the decomposition of certain constituents which give off their water, or by partial loss of hydrofluoric acid from others. There is a loss of 47% from the borax by evaporation of its water content. Soda ash loses 41% and saltpeter loses 61%. Besides this we figure a loss of 2 to 3% due to the handling of the chemicals.

The chemicals must be stored in dry clean bins as they draw moisture thus falsely increasing their weight on the scale.

Making the Enamel

Following this process, we put, according to the capacity of the revolving porcelain brick lined cylinder mill, which is half filled with porcelain or flint balls which do the crushing, that quantity of frit, to which is added a percentage of a special enameling clay, which is designed to hold the enamel in suspension, then is added a correct percentage of cold water as a vehicle. When the enamel has become ground up to proper fineness it is drawn off, into containers, such as regular ash cans, or wooden wash tubs, is laid aside and allowed to age, at least 24 hours.

There are in general, two kinds of enamel. One is the base or ground coat and the other is the cover coat of whatever color may be desired. Colors are obtained through the use of inorganic color pigments which are bought from "color makers." In most instances the colors are added to the milling process and in some cases colored enamels are smelted.

Applying the Enamel

The pieces to be enameled, of whatever size or shape, must be absolutely clean before applying the enamel.

The pieces are now given a coating of the base or ground coat, evenly applied; either by immersion into the enameler's dipping tank and allowed

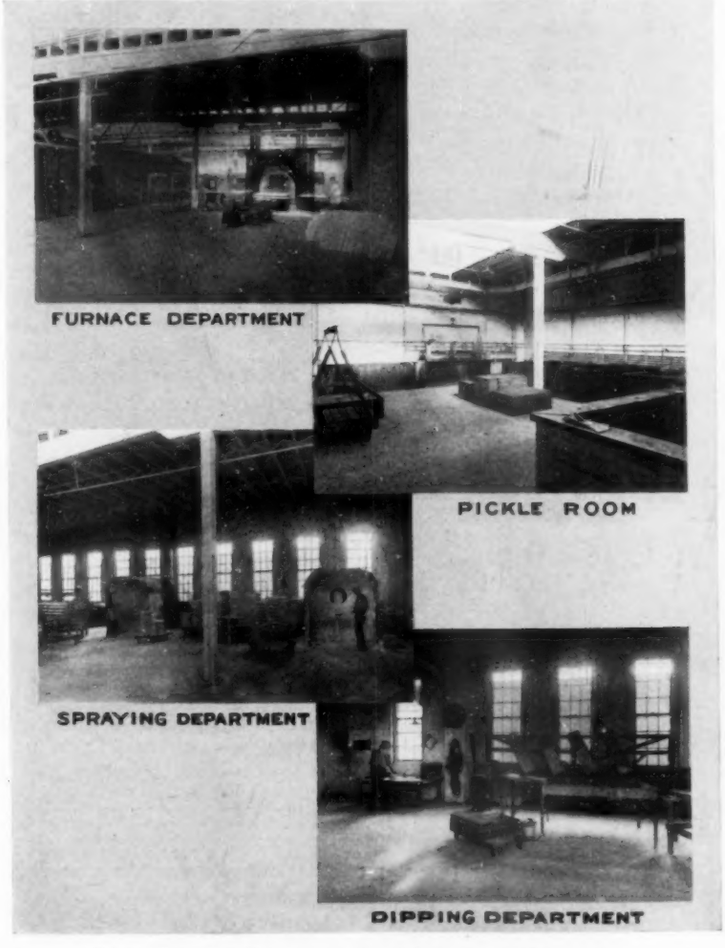
to drain, or by spraying, according to the size and shape of the piece. Then the pieces are put into the dryer, either a hot room or a conveyor, heated to about 120° F. When perfectly dry the pieces are fired, either in a muffle oven or a continuous furnace, at about 1550° to 1600° F., removed therefrom and allowed to cool, after which they receive a white or colored cover coat. This can also be done either by immersion or spraying. The work is then dried, given another firing and if the pieces are to be finished in white, they receive a second white covercoat.

Pyrometers and timer cocks control the furnace heat and the firing time, after the temperatures are determined by experiment.

Preparation of Base Metal

Now let us look into the preparing of the sheets for the enamels. The grease, oil, dirt, etc., gathered at the press, lathe or drill in cutting or forming, must be removed. The work is first put into a boiling caustic solution, 5 ozs. to 1 gallon of water, using a steel or lead lined tank. The pieces are left in this solution for 10 to 15 minutes, skimming off the top occasionally as a scum rises to the surface. From here the pieces are lowered into a fresh water tank, raising and lowering the basket or crate several times for draining and good rinsing; then to the pickling tank, into which the pieces are lowered in the same crate. This tank is a 5 or 6% sulphuric acid solution, kept at 150° F. or it may be a 11 to 12% cold muriatic acid solution. Time required is about 10 to 20 minutes. When properly pickled the pieces have a clean silvery appearance. The crate is now pulled up and lowered into another fresh water rinse tank, after which it is lowered into a neutralizer tank at 160° F. for 3 to 5 minutes. Finally, the crate is taken out and lowered onto a roller conveyor, pushed into a dryer, generally a sheet metal housing with steam heat or hot air. When the pieces are dry the crate is pushed over to the inspectors, who pass the wares to the appliers, using the empty crate for the next fill.

To facilitate the movements in the pickling room, we use an overhead rail with an air or electric hoist to carry the crates around. These are made of acid resisting Monel metal, either riveted or welded.



Departments of a large porcelain enameling plant

Formulae for Enamels

I give now a few typical formulae that will produce excellent ware:

Base or Ground Coat

Borax	30 lbs.
Feldspar	28
Quartz	20
Soda Ash	11
Fluorspar	6
Saltpeter	4½
Ox. Nickel	½
Ox. Cobalt	1
Ox. Manganese	1

Grind in the mill to each 100 lbs.
6% Enamel Clay
1½% Carb. Magnesia
About 40% cold water in the mill.

White Cover Coat

Borax	20 lbs.
Feldspar	43
Quartz	12
Cryolite	13
Fluorspar	5
Soda Ash	10
Saltpeter	2

Grind in mill to each 100 lbs.
5% Enamel Clay
6% Oxide Tin
About 35% cold water in the mill.

Coloring

For making colored enamels the white formula may be used but when milling, the tin oxide should be reduced which will reduce the opacity and better permit the color oxide to take the color wanted. Of course it is understood that color matching is difficult and requires much experimenting.

Graining with enamel to imitate wood or marble is made from an etched copper plate. The natural wood may be acid treated to soften the parts between the grain and the marble slab may be lightly sand blasted and repolished to raise the grain effect. To make a mahogany or oak grain, apply the suitable color upon the base coat, dry and fire it; then apply the paste that forms the grain, dry and fire it. The paste is spread upon the plate, and a composition roll is passed over it to pick up the design which is transferred to the enameled plate.

Shop Problems CASTING • METALLURGICAL FABRICATION • ASSEMBLING • • PLATING • FINISHING

Questions from readers relating to shop practice and answers by our associate editors

Cyanide Poisoning

Q.—We are anxious to know at once concerning the possibilities of cyanide poisoning in connection with our gold plating solutions. We are anxious to have this information at once.

Our plating facilities consist of six 2-gallon jars fixed into a steam table for heating. In these jars we keep various cyanide solutions for plating yellow gold, green gold, etc.

We are anxious to know at once if there is any danger of cyanide poisoning either from contact with the hands or from fumes.

A.—Cyanide poisoning may occur either from taking internally, or from breathing cyanide (hydrocyanic acid) fumes, or by getting cyanide into cuts in the skin.

Cases of poisoning from the first two causes are so rare among the plating trade as to be practically unknown. Of these two causes, the breathing of cyanide fumes or hydrocyanic acid gas is probably more to be encountered and for this reason it is advisable to install fume ducts to draw off air from the gold plating solutions. The ducts should be arranged so that the intake is close to edge of crock so that fumes are drawn off the one side and to the back before they rise up to level of operators breathing.

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Also care should be taken not to mix cyanide and acid solutions as the chemical reaction will produce hydrocyanic acid gas which is to be avoided.

The amount of gassing caused by the electrolysis of a gold cyanide solution will depend on the composition of the solution, the temperature and the voltage. Many platers do not ventilate their gold plating solutions but for best conditions it is advisable to install ventilation. Any legal requirements that may be encountered should be investigated for the locality in question.

Cyanide solution entering a cut in the skin will produce a "cyanide sore" which although painful is not dangerous in most cases. Ointments are on the market and are advertised in METAL INDUSTRY for treating cyanide sores. A doctor should of course be called in if the occasion warrants. To prevent cyanide sores the precaution should be observed of not getting hands in contact with cyanide any more than necessary. If cyanide does come in contact with skin, rinse off in water, dip hands in *weak* acetic acid, or in vinegar to neutralize cyanide, then rinse well in water.

—G. B. H., Jr., Problem 5,624.

Hard Chromium

Q.—We would greatly appreciate any information or references pertaining to issues of your periodical, concerning the recent developments in the hard chrome industry.

We are interested in knowing what development work has taken place in connection with the porosity or corrosion resistance of hard chrome plating when applied to carbon shaft.

Use this Blank for Solution Analysis Information

Fill in all items if possible.

Date .....

Name ..... Class of work being plated: .....
Address ..... Volume used: .....
Employed by: ..... Solution depth: .....
Kind of solution: ..... Cathode surface, sq. ft.: .....
Tank length: ..... width: ..... Kind of anodes: .....
Anode surface, sq. ft.: ..... Distance from cathode ..... Original formula of solution: .....
REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible. Use separate sheet if necessary.

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

A.—The term "hard chrome" has come into use and in a sense it is a misnomer inasmuch as the chromium which is deposited under the "hard chrome" classification, that is, for building up worn parts, or for providing wear resistance is of not much different hardness than the ordinary decorative chrome plate.

The "hard chrome" is a heavier plate, however. In this respect it is different from the decorative deposit. In general no different process is used for depositing heavy chromium deposits than has been used for lighter deposits. Either the 33 oz. or the 55 oz. solution can be used with a sulphate ratio of 100 to 1.

Your letter mentions porosity and corrosion resistance. It is known that chromium deposits are very porous, although like other electrodeposits the porosity is decreased, the heavier the deposit. But for equal thicknesses of deposit, a chrome would be more porous than a nickel, for example. Therefore if you are seeking corrosion resistance and freedom from porosity more than a hard surface it is suggested you look into nickel or other metals applicable to the case.

—G. B. H., Jr., Problem 5,625.

High Strength Alloys

Q.—We are trying to make a manganese bronze hardener to contain between eighteen and twenty percent iron, two to five percent manganese, two to five percent aluminum, balance copper. We have difficulty in keeping the iron in the mixture and, of course, what we are after is a binder. Can you help us out in this matter?

Also what can you tell us about manganese aluminum bronze, tensile strength 100,000 lbs.?

A.—To make a hardener of 20 iron, 5 manganese, 5 aluminum, we suggest that you use the following:

Make an alloy of 70 aluminum, 30 iron. Pour into ingots and use as follows:

8 lb. this alloy
10 lb. ferro manganese, 80% manganese
16 lb. iron—balance—copper

This mixture should analyze as wanted above.

High tensile manganese bronze 100,000 to 115,000 tensile, Brinell 240 to 270 carries the following:

63.75 Cu.
23 Zn.
2.75 Fe.
6.75 Al
3.75 Manganese

Aluminum bronze running 100,000 tensile and over, carry approx.

74 copper
8 iron
4 nickel
.5 manganese
13.5 aluminum

—W. J. R., Problem 5,626.

Satin Finish on Aluminum

Q.—We wish to obtain a satin finish on die cast aluminum round drawer knobs.

A.—If the production amounts to any quantity, the most economical method would be to use an automatic polishing machine. The general principle would be to set the work in either a single chuck or holder, or in a series of holders around the periphery of a wheel, and have these brought up to the face of a revolving wheel.

The type of wheel to use can best be determined by experience. Walrus hide is suggested for a trial, shaping the wheel to fit the work.

To obtain a satin effect you can use pumice moistened with oil; or, a greaseless compound such as produced by manufacturers advertising in METAL INDUSTRY, can be used with good results.

If it is not possible to go into an automatic machine a small jig can be set up with a lever and chuck arrangement so that individual knobs can be placed and brought up to the face of the wheel by a hand lever.

—G. B. H., Jr., Problem 5,627.

Pitted Brass Castings

Q.—Our table and floor lamps are made from solid yellow brass castings, which we turn on a machine lathe, and buff before a chemical dip finish. We have a problem in getting good yellow brass castings that are free from pit holes and that turn easily on the lathe.

You would be doing us a great favor by sending us the proper formula on the type of metal that we need.

A.—The following mixtures are used for yellow brass castings similar to your class of work:

65 copper 1 tin 3 lead 31 zinc
70 copper 0 tin 0 lead 30 zinc dip metal
72 copper 2 tin 3 lead 23 zinc

However, we suggest that you try the following mixture made from good metal and we believe it will eliminate your difficulty, dip well and match brass rod in color.

81 copper
1 tin
3 lead
15 zinc

No difficulty in casting will be found; it should eliminate pits, and machine well.

—W. J. R., Problem 5,628.

Pitted Nickel After Filtering

Q.—In our nickel tank we have a continuous filtration consisting of a motor-driven Bakelite pump (a cog-weel type) which pumps the nickel solution up to a filter-press, which is placed 4 feet above the nickel tank. The filtered solution drops, as a shower from a height of 4 feet into the tank.

As we are able to observe the filtration seems perfect but—we do get lots of pitting. When the pump is stopped the pitting decreases.

A.—It is not good to allow the nickel solution to become aerated as it leaves the filter press. Rather than have the solution splash down into the tank, the outlet of the press should be placed beneath the surface of the solution so that no aeration takes place.

When the solution becomes saturated with air, pitting is invited due to the fact that bubbles of air will form on the work and act as a nucleus for pitting. This explanation appears to be applicable in your case because of the fact that pitting decreases when pumping stops.

Pitting may be caused by several factors and it is therefore not to be regarded that elimination of the aeration will entirely eliminate the pitting. Other factors such as preparation of the work and resulting surface condition of the metal, solution temperature, solution surface tension, impurities such as iron, copper, zinc, or lead that may be present, will all have an influence.

The use of wetting agents has proven successful in many cases for stopping nickel pitting.

—G. B. H., Jr., Problem 5,629.

Metal Casting Digest

Short abstracts of articles of interest to practical non-ferrous foundrymen and metallurgists

By H. M. ST. JOHN
Associate Editor

Metals and Alloys in the Printing Industry. Part IV. B. W. Gonser and S. Epstein. Metals & Alloys, April 1937, page 117.

A descriptive, illustrated review.

• • •

Some Problems in the Non-Ferrous Foundry. R. J. Keeley. Iron Age, April 29, 1937, page 46.

This article deals with the use of composition ingot in the production of sand castings and gives specific illustrations of foundry difficulties investigated and overcome.

• • •

Mold Washes Which Form Good Thermal Insulators. Gustav Krebs. Giessereipraxis, Vol. 57, page 9 (1936); Chemical Abstracts, May 10th, 1937, col. 2981.

Sand control for molds is discussed.—Use of sulfite-leach liquor spray for runners is criticized as bad practice in that steam pressure casting tears the mold and produces cavities in the casting. Properties of sand when properly prepared for molding are described. A mold wash for green sand casts is recommended which produces a hardened and nonporous surface. It is a mixture of 3 parts graphite, 1 part gypsum, 1 part soapstone, 1.5 parts charcoal powder and enough alcohol to give fluidity for application to the mold. After momentary aging the mold can be used. Mold washes are given for iron, yellow and red brass, and aluminum ingots in steel molds.

• • •

Finishing of Die Castings. J. C. Fox. Proc. Amer. Soc. for Testing Materials, Vol. 36, Part I, page 193 (1936).

A review.

• • •

Problems in Bronze Manufacturing and Selling. Harold J. Roast. Metal Progress, May 1937, page 511.

An abridged combination of two addresses, one delivered before the A.F.A. convention in Milwaukee, the other before the Toronto Chapter, A.F.A.

Hardening of Aluminum-Silicon Alloys. W. Helling. Z. Metallkunde, Vol. 29, page 25 (1937); Chemical Abstracts, May 20th, 1937, col. 3434.

By varying the silicon content only, it was found that the maximum amount of hardening by precipitation was obtained with 1.5 silicon, the solid solubility at the eutectic. The dependence of corrosion resistance upon the amount of graphitic silicon varied widely with the type and concentration of the corroding agent.

• • •

The Reactions Between Molten Copper Alloys and Sulphur Dioxide. E. Raub and A. Schall. Z. Metallkunde, Vol. 29, page 16 (1937); Chem. Abstracts, May 20th, 1937, col. 3434.

Molten tin reduces SO_2 to sulphur with the formation of SnO_2. Commercial tin bronzes form SnO_2 and CuS and the equilibria for different temperatures and compositions are determined. Aluminum and aluminum bronzes form Al_2O_3 which goes partly into solid solution. Brasses with less than 8% zinc form ZnO plus Cu_2S, while with more than 12% zinc, the products are ZnO and ZnS. The ZnO forms slag or vaporizes, while the sulphides are highly soluble. Additions of 0.2% magnesium, manganese, beryllium, lithium, aluminum and phosphorus to 5% tin alloys were studied. The amount of SO_2 taken up by the melt was increased by lithium but decreased by the others, aluminum being the most effective.

• • •

A Study of Non-Ferrous Molding Sands. H. W. Dietert and Earl Woodliff. Trans. Amer. Foundrymen's Assoc., June, 1937.

The authors undertook a study of molding sand used in non-ferrous foundries for the purpose of correlating test figures obtained, from samples submitted, with other foundry variables such as molding methods, casting weights, type of metal used, etc. The results cover data obtained for sands used to produce aluminum, brass, bronze, copper-nickel, and copper castings, and include kind of sand used, method of molding, sand preparation, flask equipment, mold facings, casting finish, green strength, deformation, dry strength, moisture, permeability and fineness. The authors found natural sands were used exclusively for aluminum and brass castings, that mechanical sand preparation equipment is used extensively in non-ferrous foundries, that few non-ferrous foundries vent the flask equipment, that in the majority of foundries making aluminum castings the permeability ran less than 10 and was between 10 and 20 for brass and bronze sands, that 7.5 lbs. per sq. in. was about average green compression strength for non-ferrous sands, that dry strength varies considerably, and that pan material was very prominent in the majority of samples submitted. The authors also evolve formulae for calculating permeability and the approximate moisture content required.

• • •

Furnaces for Aluminum Alloys. G. C. Castle. Metal Industry (London), May 7th, 1937.

The electric furnace is generally recognized as most efficient and economical for melting light metals. Arc furnaces are not suitable but crucible furnaces, resistance-type tank furnaces and induction furnaces are successfully employed. Crucible furnaces use wire heating elements and are pyrometrically controlled; current consumption is 50-55 kw. hrs. per 100 kg. (220 lbs.) of aluminum. Tank furnaces are built of larger capacity, and use 450 kw. hrs. per ton. In the induction furnace, also built in large sizes, the current consumption is only 360 kw. hrs. per ton. The "burning" loss was found to be 1.5% in an oil-fired tank furnace, 1.2% in an electric tank furnace, 0.8% in an electric induction furnace. The circulation of the metal in the induction furnace is also a metallurgical advantage.

Modern Production Equipment

New processes, machinery and supplies for metal products manufacturing and metal finishing

Portable Pyrometer

The instrument shown in the illustration is a new portable recording pyrometer—one of a new line of Pyromasters manufactured by The Bristol Company, Waterbury, Conn. The simple operating principle of these instruments and their compactness of construction are said to give them special features especially useful for portable service. In summary these features are given as follows:

The instrument is unusually rugged—not affected by vibration—does not require careful leveling while in use.

When an unbalanced condition in the potentiometer circuit occurs, a series of relay-actuated switches operate a motor to position the slide wire contact to which the pen arm is mechanically connected.

The galvanometer is equipped with a highly damped coil; the galvanometer arm is free to deflect at any time, not being periodically engaged by a clamping device.

The instrument is constructed so that it is composed of five separate replaceable units; there is no mechanical connection between the galvanometer and any of these units, the connection being electrical, only.

Bristol's portable Pyromasters are available as pyrometers for ranges from 0 to 500 up to 0 to 3000° F., using standard thermocouples. They are also available as resistance thermometers, for ranges from 20 to 350° F. Provision is made on the case for suitable plugging devices to connect these instruments to the thermocouple or resistance bulb, and to a source of a.c. power,

Bristol portable Pyromaster

110 to 220 volts. The chart is 12 inches in diameter and rotation is by telechron clock.

Bulletin No. 489, now available, describes Bristol's Pyromaster Recorders, Controllers, and Indicators.

Monel Made with Ebony Finish

Research engineers of the Huntington Works, W. Va. of The International Nickel Co., Inc., 67 Wall St., New York, have produced "Ebonized" Monel with an ebony finish designed for use where appearance must be maintained under temperatures up to 1400° F.

The material is identical with standard Monel except that a lustrous "blue-black" finish is imparted in a specialized oxidizing operation. It has been created particularly for a newly designed heat deflector used in Chromalox super-speed range units manufactured by the Edwin L. Weigand Company.

Element pans, reflectors and deflectors in all electric heating units have been source for complaints because the material from which they are made invariably suffer heat discoloration or stain and rust. Since this new ebonized metal like standard Monel possesses complete rust immunity and diversified resistance to corrosion in addition to its new ability to resist discoloration from relatively high temperatures, it helps provide insurance against costly replacements and unsightly appearance.

The deflector design is an interesting one. Until now, most heating units were equipped with *reflectors*—pans of bright materials that tended to reflect heat back up toward the unit. The deflector presumes the operation of a flue. It convects air currents that in turn transmit escaping heat back towards the middle of the element. In this manner the heat is intensified by the up-draft air currents directed by the design of the ebonized Monel deflector.

Tests by thermal experts demonstrate, it is stated, that an improved efficiency is obtained with the unit.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Lubricant for Drawing of Steel Wire. Metasap Chemical Co., subsidiary of National Oil Products Co., Harrison, N. J.

Conveyor Belting; features Cord construction. B. F. Goodrich Co., Akron, Ohio.

Air Motor Drive for Agitators; built integral in paint drums. DeVilbiss Co., Toledo, Ohio.

Hydro-Dynamic Press—1000 ton. E. W. Bliss Co., 1420 Hastings St., Toledo, Ohio.

Molded Composition Mallets—"Saf-ty." Martin Bersted Co., 20 E. Jackson Blvd., Chicago, Ill.

Floor Service Lighting Units—Turnlox. Hood construction permits the reflector and lamp to be cleaned without the use of ladders or the necessity for getting off the floor. Benjamin Electric Mfg. Co., Des Plaines, Ill.

A Manual of Metal-Cutting Information. Better hack saw blades. W. O. Barnes Co. Inc., Detroit, Mich.

Anatomical Shirt. For practical and graphic instruction in the location of arteries, bones and organs of the torso and arms. Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa.

Automatic Feed Press. No. 79½ open tack press on fixed legs. Toledo Machine & Tool Co. division of E. W. Bliss Co., 1420 Hastings St., Toledo, Ohio.

Two-Wheel Wide Range Precision Grinder. Sizes from 1 to 10 H.P. and for wheels 8 to 20-inch diameter. Hisey-Wolf Machine Co., Cincinnati, Ohio.

Vibrometer, for measuring amplitude of vibration of structural or machine members. American Instrument Co., 8038 Georgia Ave., Silver Springs, Md.

Explosimeter; a pocket-sized instrument for quickly and easily determining combustible gas hazards. Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa.

Brass, Screwed End Globe and Check Valves, for 350 pounds steam pressure at 550 deg. F.; *Brass Globe and Angle Valves*, with plug type disc for severe service on small lines carrying steam, hot water, cold water, oil, gas and similar liquids; *Iron Body Globe and Angle Valves*, with plug type discs; *Brass Fittings* for flared copper tubing. Crane Co., 836 S. Michigan Ave., Chicago, Ill.

Electrode for Welding with Small A. C. Transformer Welders. Lincoln Electric Co., Cleveland, O.

Snopake; to reduce the excessixe glare during the winter months in buildings adjacent to open fields where large expanses of snow are present. A pale green adhesive liquid to be brushed or sprayed over windows. Skybryte Co., Cleveland, Ohio.

Berco White Coating; an all-purpose white coating which forms an ideal printing base for decorated caps and cans. North Bergen Varnish Corp., 989-39th St., North Bergen, N. J.

Rope Guide Hoist; for side and end pulling or wherever loads cannot be brought directly under the hoist. Electro Lift, Inc., 30 Church St., New York City.

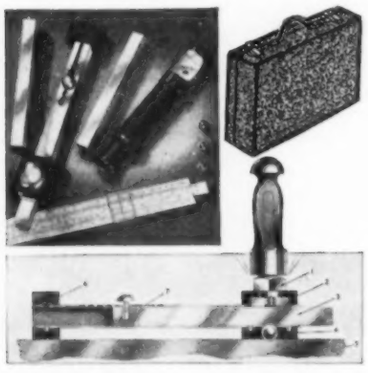
Inverted Bucket Trap. New straightway type BM-O available in one size with ⅜″ or ½″ inlet and outlet connections. Sarco Co. Inc., 183 Madison Ave., New York.

Girl worker inspecting miniature hair springs

Portable Brinell Hardness Tester

A light weight, portable Brinell instrument that can be carried easily right to the job is said to simplify metal hardness tests in the field, remote from laboratory facilities and around industrial plants. According to the manufacturer it can be used in close quarters and can be applied to parts and equipment the size of which have, heretofore, made testing difficult, expensive and sometimes virtually impossible. It eliminates both the necessity of dismantling equipment to be tested and transporting specimens to the laboratory. It is known as the Telebrineller. The combined weight of the outfit and carrying case is only 6½ pounds. According to the manufacturer it is not affected by hot or cold weather and is built to stand hard use. No training or previous experience, it is claimed, is necessary to operate it accurately.

The outfit is composed of the Telebrineller instrument proper, a bar of known hardness, a microscope with a scale etched in its focal plane and a slide rule, packed with extra test bars and impression balls in a small case. The instrument itself consists of a metal tube supported in a soft rubber head (2) and a rubber spacing block (6), the tube holding the bar of known hardness (3). An anvil (1) in the top of the rubber head rests directly on the bar. Below the bar an impression ball (4), secured in a narrow aperture in the base of the head comes in direct contact with the metal to be tested. The spacing bar (7) holds the bar in a clear area for each test.



Teleweld portable Brinell hardness tester

To make a test the instrument is held against the specimen and the anvil is struck a sharp blow with a 3 to 5 pound hammer. The impact is transmitted through the anvil to the bar, then to the ball and on to the specimen. Force of the blow is said not to be a factor, the diameter of the impression in the bar and in the specimen being, in any case, relative to their individual Brinell hardness number (BHN).

The diameters of the impressions are then measured in 1/10 millimeters by placing the microscope over each in turn and reading the scale. Figuring the BHN is then a simple matter using either an arithmetical formula or the slide rule.

Literature fully describing the Telebrineller and its use can be obtained from Teleweld, Inc., Railway Exchange Bldg., Chicago, Ill.

Fine Wire for Electrical Instruments

Wire but three thousandths of an inch in diameter, smaller than the hair from one's head, is flattened between powerful polished rollers and made into delicate springs for light or exposure meters such as used by photographers; wire three times as small, so fine the human eye can scarcely see it, is smoothly wound into tiny aircraft instrument coils of a definite and exact number of turns; instrument pivots are made with points sharper than the most perfect needle. All this is done in the meter and instrument laboratory and workshop of General Electric in its West Lynn plant, as part of the daily routine which turns out 4,000 or more meters and small measuring instruments per day.

Meters and instruments are the yardsticks of the electrical industry. The most common use is the accurate integrating of the flow of electricity into the home.

For each type of electric instrument, the engineering staff specifies a spring of definite dimensions: length, breadth, thickness. The ratio of these dimensions is very critical; for the most satisfactory operation of the instrument, the ratio of length to thickness must be more than 2500 to one. Also, the exact thickness of the spring ribbon is very important because the torque exerted by the finished spring varies directly with the cube of the ribbon thickness. Doubling the thickness would increase the torque eight times. Tweezers and microscopes are also used in the manufacture of these tiny springs. Bronze wire but three thousandths of an inch in diameter is passed through highly polished and powerful rollers and flattened to a uniform thickness of nine ten-thousandths of an inch, and one hundredth of an inch wide. These delicate strips, far thinner than human hair, are cut to size, wound into tiny spirals and then placed in an electric furnace. They emerge clean and bright with the exact mechanical rigidity they must maintain throughout their long use.

Novel Method of Promoting Die Castings

By letting the product speak for itself, The New Jersey Zinc Co., 160 Front St., New York, introduced a novel means of telling the story of zinc alloy die castings to visitors at their booth at the National Metal Exposition in Atlantic City. Among many other assemblies of die castings exhibited was a collection of 37 parts used in the Wurlitzer coin-operated phonograph; with duplications of the number of die castings in each unit number 71. With an application of this kind, the (now) obvious reaction was to have the phonograph tell its own story.

The 37 different zinc alloy die castings from the unit were mounted on a display board and placed beside a beautifully finished Wurlitzer model. A special record was professionally prepared to explain the part

Zinc base die castings used in the coin-operated Wurlitzer automatic phonograph

die castings play in the mechanical perfection of the phonograph. Visitors were enthusiastic about the method of presentation and came away from the exhibit vividly impressed with the wide use of zinc alloy die castings in assembles of this type.

Part of the text that was used on the record follows:

"Gentlemen, your attention for a moment! Let me tell you *my* story in my own way. You will find that I, too, know a thing or two about zinc alloy die castings.

My skeleton of working parts is almost wholly composed of zinc. I contain 71 different parts die cast in the Zamac zinc alloys. In all, my bones of zinc weigh 34 pounds—and 37 different die cavities are required to make them. Many thousand of my immediate family are born every month.

Note the zinc alloy die cast parts of my anatomy—arranged on the display board beside me.

All in all I am full of zinc alloy die cast frames, couplings, brackets, cams, levers, fingers, discs, and doodads. Look at the two sturdy chassis end frames that carry my most intricate functional organs. These are at the extreme right and left sides of the display board. Finally, my hands—three of them—with which I accept your coins—are made of 6 most interesting die castings. These parts are strung along the bottom edge of the board. See how fine and accurate they are.

But now let my parents, the engineers at The Wurlitzer Company tell you why they wanted me designed in zinc.—My job is to do things—some one else planned me. Here is Mr. R. C. Haimbaugh, Chief Engineer of the Rudolph Wurlitzer Company in North Tonawanda, New York—

Principally, zinc alloy die castings are used in the Wurlitzer Automatic Phonographs to save production expenses and reduce the cost of the unit. Die casting permits of producing complicated parts in a single step, and results in parts which require very insignificant machining and finishing—if any. Often by using die castings, we can do in one or two parts what would otherwise require complicated assemblies. Further, with the zinc alloy of today the strength and durability characteristics of die cast parts are excellent."

Temperature Gauges For Industrial Use

The initial units in a line of modern temperature gauges which differ materially from any previous type of industrial indicating thermometer have just been introduced by the Weston Electrical Instrument Corporation, Newark, N. J. These new instruments are of the modern dial-and-pointer type, said to be the first industrial application of a new "coils-within-coils" design for the bi-metal temperature-sensitive element. This all-metal temperature element is sheathed within a stainless steel stem. The circular dial case, 3-in. in diameter, is mounted at right angles to and at the top of the stem. Accuracy is guaranteed to 1% over the entire scale.

Three models are being introduced for use in checking operating temperatures in industrial applications such as heaters, dryers, baking ovens, and small furnaces which have operating temperatures below 1,000 deg. Fahrenheit: (1) For dryers, having a range of 50 to 500 deg. F.; (2) For bakery ovens, having a range of 150 to 750 deg. F.; (3) For industrial ovens, having a range of 200 to 1,000 deg. F.

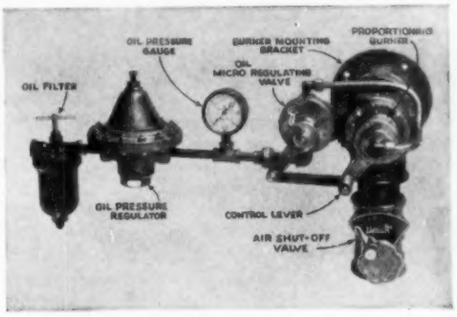
The scale divisions of the circular dial are easy to read; the anodized aluminum dial face is provided to offer a distinct advantage, since this type of scale is unaffected by the temperature to which the head may be subjected.

Weston temperature gauge

The construction of the temperature element is inherently rugged and durable, with the result that the temperature gauge is practically unbreakable in use. Due to its all-metal temperature element, it responds rapidly to temperature change. In addition, reasonable over-temperatures do not harm the gauge or affect its accuracy. The permanence of these characteristics is insured by the "coils-within-coils" principle used only in Weston thermometers.

Proportioning Oil Burner

A new oil burner, first introduced on a trial basis in January, 1937, by the Hauck Mfg. Co., 126-10th St., Brooklyn, N. Y., is said to have performed remarkably in metallurgical, chemical and ceramic plants. It is designed to automatically proportion and maintain correct, straight line air-oil ratio from minimum to maximum capacity, to give accurate temperature control over an unusually wide operating range. It produces



Hauck Proportioning oil burner assembly

controlled furnace atmosphere, giving CO_2 readings between 13 and 15%.

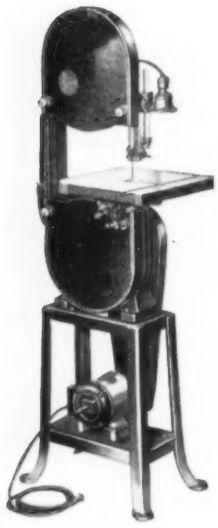
By moving a single lever, air and oil supply is automatically controlled and maintained and primary and secondary air orifices are simultaneously adjusted. This eliminates frequent adjustment of burner and regulation of air and oil valves. Very low and efficient flame turndown can be obtained. Since air is controlled by burner nozzle orifices, maximum atomizing air pressure and constant air velocity are maintained at the point of oil atomization. Thereby reduced air pressure is eliminated at point of oil atomization when burner is turned down.

The Hauck Proportioning Oil Burner burns any grade of fuel oil. Tests on several hundred burners on various heat processing operations are said to have shown fuel savings of from 10 to 15% in oil consumption.

Metal-Cutting Band Saw

Designed for a wide range of cutting operations, a new metal cutting band saw recently announced by the Delta Manufacturing Co. of Milwaukee, Wis., is said to be one of the most useful tools for the all-around shop.

The band saw is of 14" capacity, and will cut materials up to 6" thick. With an extension attachment the capacity under the guide can



Delta metal cutting band saw

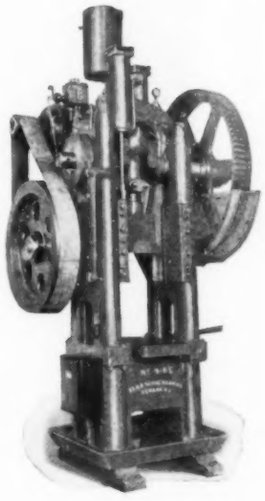
be increased to 12" when necessary. The saw has five speeds; four for metal, of 125, 175, 250 and 340 feet per minute, and one for wood of 2200 feet per minute. The slow speeds are obtained through a ball-bearing gear box, and the wood speed is obtained direct from the motor by a V-belt drive. Change from low to high speed is accomplished simply and easily. The machine is ball bearing throughout, New Departure self-sealed bearings being used to eliminate the necessity of lubrication.

The machine can be used for cutting templates, for experimental work, for sheet-metal sawing, sawing jig and fixture bases and similar parts, fitting light structural sections and extruded shapes, trimming gates in iron, brass and aluminum, sawing plastics and for many similar purposes.

It can be used in toolroom, machine shop, pattern shop, ornamental-metal shop or foundry, as well as in many general industrial applications.

Straight Side Press

Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J., have just brought out a new design of a straight side press. This press is of built-up tie rod construction, single crank, having a capacity of 75 tons. The maximum stroke is 12"; bed area, front to back, right to left, 20 x 19". The press is equipped with balancing cylinders for



Zeh & Hahnemann straight side press

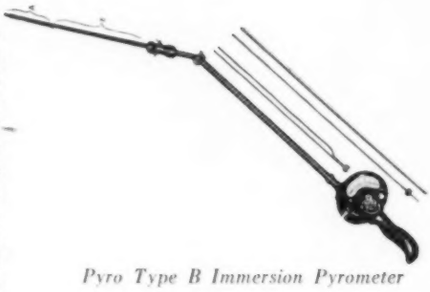
the slide, force feed lubrication; Norma-Hoffman roller bearings, individual motor drive, and oil pan and pump.

The weight, geared, with motorization, is 11,000 lbs. Overall floor space, 59 x 53. Number of strokes per minute—50.

Improved Pyrometer

Heretofore pyrometers for non-ferrous foundries were obtainable with either bare metal thermo-couples or with the so-called "protected type" thermo-couples, both of which have advantages under certain operating conditions. The Pyrometer Instrument Co., 103 Lafayette St., New York, is now prepared to furnish their various types (straight or flexible) of Pyro Immerison pyrometers for non-ferrous metals with interchangeable thermo-couples of various lengths either of the "bare metal" or the "protected type" both being interchangeable within a second.

The instrument itself is said to be an extremely sturdy and rugged unit with a new type convenient handle and equipped with a correction screw on the face to maintain perfect calibration at all times. The indicator has a patented clamping device which fixes the indicating needle at the correct temperature indication which may be read



Pyro Type B Immersion Pyrometer

and noted *after* withdrawal. A second pressure on the red button on the housing and the needle swings back to its zero setting. This locking device serves also to protect the instrument from internal damage while it is being carried or while in transit.

The new illustrated Catalog No. 110 will be forwarded on request.

High Temperature Bonding Mortar

Further improvement has recently been made in the refractoriness and working quality of Harwaco Bond, a high temperature bonding mortar recommended for use in industrial furnace masonry.

The improved product has a Pyrometric Cone Equivalent of Cone 32 (3092 degrees Fahrenheit). Use of this diaspore-base bond-

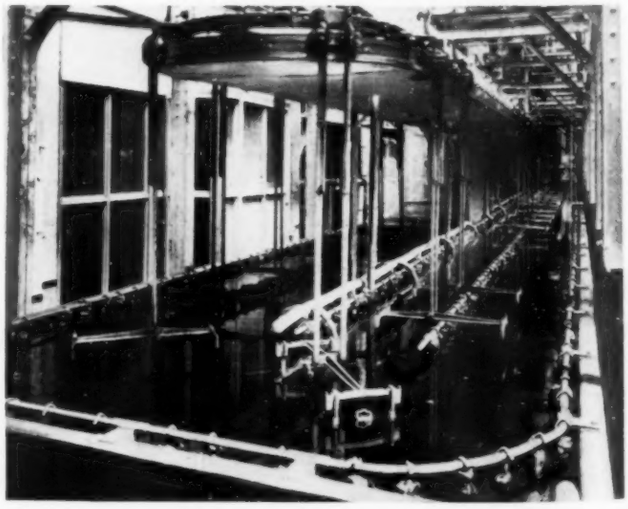
(*Continued on page* 631)

Rubber-Lined Tank for Bright Nickel Plating

This 70-foot steel tank, lined with Triflex rubber by the Vulcalock process of The B. F. Goodrich Co., Akron, O., was installed 3½ years ago in the plant of a prominent Detroit automobile manufacturer. During this period it has been used in connection with the Harshaw process of bright nickel plating at operating temperatures of 140° to 150° F.

The operation has been uniformly successful with no interruptions for tank repairs. No trace of "treeing" or "plating out" has been encountered on the surface of the rubber lining. The solution is filtered continuously to prevent accumulation of sludge.

This installation is of particular interest to platers because of its size and the fact that it typifies good bright nickel plating practice.



70-foot rubber-lined tank for bright nickel plating

ing mortar in place of mortar consisting essentially of fireclay is said to be increasingly general for laying fireclay, super-duty fireclay, and high-alumina brick where a strong bond must be maintained at the upper limits of industrial furnace operating temperatures. The manufacturers state that it remains uniformly soft and plastic throughout the steel drum or container in which it is shipped.

The improvement in the product is the result of several years of research by the Harbison-Walker Refractories Company, Pittsburgh, Pa.

Cleaning Brass Castings

Taking advantage of new mechanical aids, the Loeffelholz Co., Milwaukee, Wisc., has effected important cost reductions in its cleaning department, still maintaining its very high standard of quality as to finish, and improving working conditions by elimination of the dust hazard.

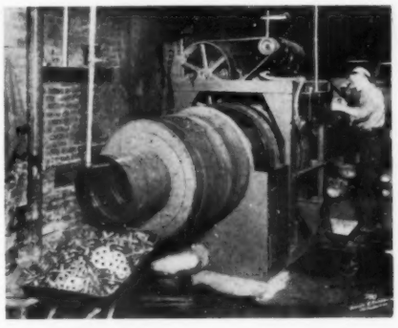
The company operates a small foundry, producing two tons of miscellaneous brass castings per 8-hr. day. Until quite recently one man's entire time was required to clean the output.

A wet milling process was adopted, using an Ideal Cascade mill. The mill is loaded by the operator (who devotes only one third of his time to this cleaning room work), a batch consisting of two pans of large parts or three pans of small parts. If small castings and large castings are run in the same batch, the mill will handle three pans. Castings as dissimilar in shape as possible are run together, to facilitate sorting.

In the drum, the castings float in a fluid mass of cleaning material, the parts never touching each other. All surfaces—even small interstices—are thoroughly cleaned. Crucible droppings are ordinarily used as cleaning material. The addition of granite chips or silica sand produces a matt finish. When a bright finish is called for, a pound of cream of tartar is put in the drum.

As the mill rotates, the castings wallow in the mass of cleaning material until thoroughly cleaned. A stream of clean water runs into the drum, preventing the creation of dust. The water is not recirculated but is run into a sump where the sand is settled out. Water cost runs about $1.00 a month. Reversing direction of drum rotation, discharges the batch to a second section which screens out the cleaning material. The castings emerge at the end of the screen. Cleaning material is caught in a cone shaped drum surrounding the screen. Again reversing the direction of the drum, the operator causes the cleaning material to return automatically to the cleaning section, ready for the next batch of castings. Loading and unloading require about two minutes. The entire cleaning cycle takes from 5 to 15 minutes. The operator is able to inspect the work while the drum is in operation and govern the cleaning period accordingly.

The Cascade mill cleans the daily plant output in four hours and saves $100 a month in power cost. A comparison of cleaning costs by the old and the newly adopted method follows:

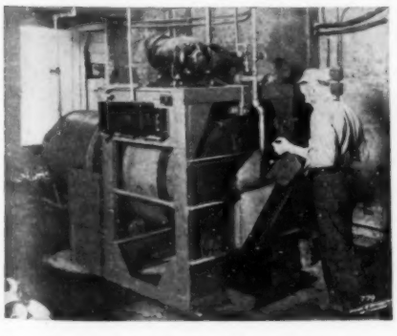


Cleaned castings automatically separated from cleaning material, discharged to barrows.

Former cost	$5.00 per ton
Cost with Ideal Cascade Mill as follows—	$1.00 per ton
Operating cost	.25 per hr.
Labor	.20 per hr.
Cream of tartar (or silica sand)	.05 per hr.
Total	.50 per hr.
½ ton cleaned per hour @ $1.00 per ton	

As the equipment is now cleaning two tons per day in the Loeffelholz plant, the daily saving on cleaning costs amounts to $8.00.

The Ideal Cascade mill is manufactured, for both wet and dry tumbling, by N. Ransohoff, Inc., Cincinnati, Ohio.



"Ideal" Cascade mill being charged with castings.

Solder for Various Metals

A new, specially developed, high tensile strength solder and all-metal flux for low-temperature soldering of such difficult-to-solder metals as aluminum, cast iron, stainless steel, monel and zinc base die castings as well as other metals, has been announced by The Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.

It is stated that while this solder is applied at low temperatures only slightly above those used for ordinary soft solders, it forms a bond with a tensile strength many times as great, and it can be used for such very difficult production and repair jobs in factories and shops as soldering of cast or sheet aluminum products, joining aluminum and stainless steel, aluminum and copper, etc. It also can be used in foundries for filling in blow holes in aluminum and other castings and can be machined, polished and plated, if desired, it is stated.

Imperial All-Metal solder and flux

The solder is designed for use in connection with the special flux which is furnished in conjunction with it, the flux being used to dissipate the oxides on the surface of the metal preparatory to the application of solder. Blow torch, welding torch or large soldering iron can be used for applying the solder. Solder melts at approximately 500° F.

The new product is known as Imperial All-Metal Solder and Flux and is sold in kits which contain solder, flux, emery cloth and directions.

Bright Plating Solutions

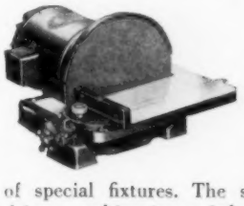
Chas. F. L'Hommedieu & Sons Co., 4521 Ogden Ave., Chicago, Ill., announce that they are now prepared to offer to the trade Reliance bright zinc solutions and also Reliance bright nickel solutions. They invite correspondence from all those who may be interested.

Two New Disc Sanders

Designed to meet the needs of both the machine shop, the pattern shop and the cabinet shop, two new disk sanders just announced by the Delta Manufacturing Co., 600 E. Vienna St., Milwaukee, fill the gap between light machines previously available and the heavy, permanent installation machines.

One model is a direct-driven type, with a base upon which may be mounted a ½ or ¾-H.P. motor. The other model is belt-driven, and is designed to be used with an existing drive, or where odd voltage or frequency motors must be used.

Both machines have 12″ disks, 10 by 16″ tilting tables with graduated sectors for angle of tilt. Tables are provided with ⅜″ by ¾″ groove for miter gage or for guidance



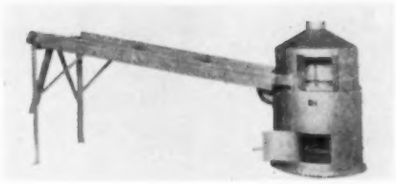
Delta disc sander

of special fixtures. The shaft of the belt-driven machine is carried on self-sealed ball bearings, requiring no lubrication.

A sawdust blower is available, making the machine adaptable for use in locations where the usual disk-sander dust is objectionable.

Hot Tinning Furnace

A new furnace for tinning sheet metal made by the Monarch Engineering & Mfg. Co., Baltimore, Md., is a gas-fired unit having automatic temperature control. It measures 29 in. in diameter, carries a pot above a combustion chamber measuring 20 by 13 inches. Overall height of the furnace is 36 inches. Products of combustion pass out of the combustion chamber through a flue connection at the side of the furnace. This connection communicates with a double bottom in the inclined trough shown to the left in the illustration. The underneath portion of this double bottom is insulated, so heat is held in. The upper portion of the double bottom forms the trough base, is mained in a heated condition.



Monarch hot tinning furnace

The material to be tinned is placed on racks on the trough and metal is ladled out of the pot and poured over the work. Excess metal drips or is wiped off, falls onto the hot trough and returns to the pot by gravity.

Rubber Covered Dipping Baskets

Carpenter Metal Products Co., 446 E. 131 St., Cleveland, Ohio, are manufacturers of dipping and plating baskets made of perforated metal covered with 1/16″ thickness of rubber insulation to resist acid. The basket illustrated is 13″ by 13″, and comes with or without stationary and folding handles; one of many sizes manufactured for the trade.

Carpenter rubber covered dipping basket

The perforations are ⅜″ in diameter. The rubber coating is soft enough to withstand bending and will not peel and break off in handling.

Four braces are placed vertically on the outside wall and a double brace on the bottom. The handle drops to the side of the basket or stands stationary; two stationary handles can be applied on the upper rim. These handles extend far enough above the basket to keep the operator's hands from contact with the acid.

Shin-Foot Guard

A new type of guard for shin and foot has been designed for use in industrial plants where it is necessary to protect the worker from blows by blunt or sharp tools, falling or flying objects, burns from hot metal or sparks, etc. The shin guard, illustrated, is made of an aluminum alloy, built in conjunction with a foot protector designed to withstand the impact of 100 pounds dropped from a height of three feet. It permits free action of the leg both forward and backward and is easily removable.

The manufacturers, Ellwood Safety Appliance Co., 217 Fountain Ave. E., Ellwood City, Pa., produce the guard regularly in heights of 12 and 14 inches, and can furnish it in any height.

Ellwood shin-foot guard

Chrome Plating Rack Enamel

An enamel for insulating all but the contact points of the racks used in chrome plating has been developed by Maas and Waldstein Co., makers of industrial finishes, Newark, N. J. This chrome rack enamel, it is stated, effectively insulates all parts of the rack that it covers, thereby preventing the dissipation of the current. It is applied by dipping the racks (with the contact points protected by tape) into the enamel. Three or four coats are required, which can be applied at intervals of about 2 hours. After the final application, the coating becomes hard enough for use if forced-dried for 2 hours at 150° F. or air-dried for 24 hours. This work can be done in any plating shop. This enamel is supplied in two colors—red and black.

Flexible Shaft Grinder

The Jarvis Vario-Flex is designed to maintain constant surface speed of grinding wheels regardless of the reduction in diameter with use on tough grinding and snagging jobs. With the fourteen different speeds of the Vario-Flex, a wheel 10″ in dia. may be worn down at a maintained peripheral speed to 4½″, by raising the speed from 2200 rpm. to 4700 rpm.

Jarvis Vario-Flex grinder

Features given for this flexible shaft grinder by the manufacturers, Charles L. Jarvis Co., Middletown, Conn., are as follows:

From 12 to 14 instant speed changes without stopping machine.

Totally enclosed ball bearing motor.

Complete 360 degrees swivel of motor unit.

Heavy duty handpiece with 2 double-row ball bearings.

Accessories recommended are steel guard and double outer handpiece.

Coloring Bath

A new process, controlled by the Heatbath Corporation, Springfield, Mass., is known as Pentrate Black and is a coloring bath which provides the means of applying an attractive, durable black finish to steel parts, tools, stampings, screw machine products etc. at temperatures as low as 300° F. This process is said to be applicable to practically all steels, including high speed steel, with the exception of the high chromium stainless types, and a process is now being developed to take care of these.

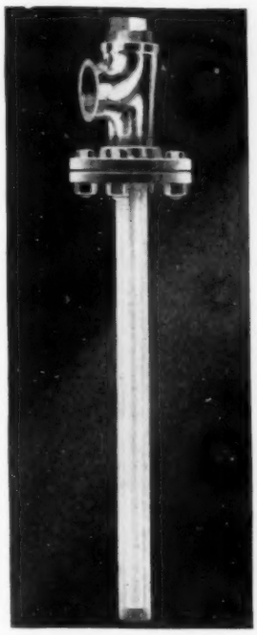
With this finish, it is stated, hardened dies, taps, reamers, etc., can be given a black finish without loss of hardness and parts that have been case hardened may be given this lustrous black without loss of surface hardness.

Pentrate Black, it is claimed, is not a surface wash or plate but a penetration, as hard as the material to which it is applied; it will not peel, chip or crack and is not affected by heat or cold and may be used on parts where it must stand bending after the finish is applied. It neither increases nor decreases the size of the piece treated and although the manufacturers do not claim rust prevention for this finish, it does have considerable atmospheric rust resisting qualities which make possible the storage of treated parts without additional protection against rusting. It does not deteriorate with use.

Tantalum Immersion Heating Units

Tantalum "Candle" heaters for acids, solutions and other corrosive liquors are a recent development for acid pickling and plating baths put out by the Fansteel Metallurgical Corp., North Chicago, Ill. A Candle Heater consists of a heating tube, an inner pipe and a special tee connection. Steam enters the tee and condenses on the inner wall of the tantalum candle, passing its heat to the liquid. The pressure of incoming steam forces the condensate upward through the base metal inner pipe, and out through a trap.

The Candle Heaters are made in a number of diameters and lengths to meet various heating requirements. They are designed primarily for open tanks or vats although there is no reason why they cannot be used in closed vessels if installed properly. The heater is usually submerged vertically to within three inches of the flange at the top. No side or bottom openings in the vessel are required, thus removing danger of leakage; the heater is supported by the piping. Nothing but tantalum comes into contact with the liquid and this metal is totally inert to even such strong reagents as hydrochloric acid, ferric and other chlorides, nitric acid or even boiling aqua regia.

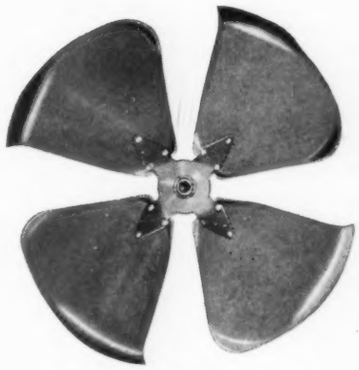


Fansteel "Candle" heater

Four Blade Propeller Fan

The Trane Co., La Crosse, Wis., has developed a new propeller fan constructed for quiet operation and high efficiency. The fan is built with four curved steel blades of large area set at an angle of thirty degrees with the plane of rotation. The curvature of the blades is so formed to insure the leading edges entering the air stream without shock. Their wide tips provide for the gradual acceleration of the air, to insure quiet operation.

The quietness of these fans opens up a new field of applications. Not only are they being incorporated into Trane unit heaters, including the recently introduced ceiling-mounted Projection Type, but also in unit coolers, evaporative condensers, and other apparatus requiring relatively large volumes of air at moderate pressures.



Trane four-blade propeller fan

3 HP Electric Grinder

Clark 3 HP. grinder

A recent addition to the complete line of industrial grinding equipment has been made by the James Clark Jr. Electric Co. of Louisville, Kentucky, a 3 H.P. floor grinder. Interesting features are the safety devices furnished as standard equipment with this machine, namely hood adjustable for wheel wear, shatter-proof glass eye shields and latest type switch with over-load and under-voltage protection. The uppermost thought in the design of this machine was to make the grinding wheels as accessible to the operator as possible yet protect him from injury.

This grinder is said to be adaptable for either production work or general tool grinding. The rotor shaft is mounted in heavy duty precision type ball bearings grease lubricated. Overall housings protect the bearings against the entrance of grit and dirt. The motor is totally enclosed and is rated at 3 H.P. for constant duty at 1750 R.P.M.

Maximum wheel wear and maximum clearance for work is said to be assured by the small diameter of the motor frame.

A micrometer set attachment for grinding twist drills (up to 1¼" diameter) can also be furnished for this grinder at slight additional cost.

Heat Resisting Aluminum Paint

Maintenance engineers will be interested in a development in the manufacture of aluminum paint. This product is recommended by the manufacturers, American, Asphalt Paint Co., 43 E. Ohio St., Chicago, Ill., for use on all metallic surfaces subjected to high temperatures.

Valdura high heat resisting aluminum paint will stand 1000° F. Its success is said to lie in its ability to fuse with and become a part of the surface. Therefore, best results are obtained where the temperature exceeds 450° F.

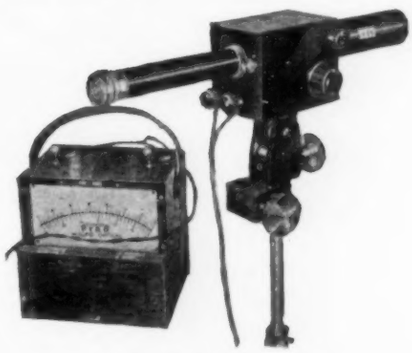
Applied while the surface is cool, the temperature should be gradually raised to the normal point of operation. Manufactured articles should be baked for an hour at 450° F.

Valdura high heat resisting aluminum paint, it is stated, produces a brilliant, silver-like finish that is not affected by smoke, fumes, chemicals or moisture, and is of such smoothness that it is not readily affected by wear and therefore can be expected to give unusually long service. It is said to cover perfectly in one coat. A gallon is sufficient for 650 to 700 square feet of freshly cleaned metal. On rough castings the coverage is slightly less.

This product is recommended for use on manufactured articles and any other metallic surface subjected to high temperatures.

Micro-Optical Pyrometer

A new instrument has been placed on the market, the Micro-Optical Pyrometer by the Pyrometer Instrument Co., 103 Lafayette Street, New York City. This pyrometer is recommended for measuring the temperatures of very small objects, such as incandescent lamp filaments, and for laboratory and scientific research work. A 20-fold magnification of the object is provided by means of an optical arrangement of high



Pyro Micro-Optical pyrometer

candle power. To obtain the best results, the instrument is furnished with a rigid support and tripod, the instrument holder being equipped with a fine precision worm gear arrangement for accurate adjustment in any desired direction so as to focus steadily on any given spot or the smallest object.

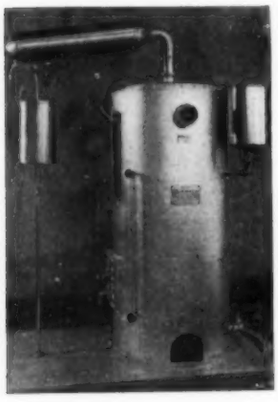
A precision ammeter with built-in battery is attached to the instrument which operates on the principle of the disappearing filament and is furnished with the following scale ranges; 600-1600 deg. C.; 1600-3000 deg. C.; 3000-4000 deg. C.; or the equivalent in degrees F.

The ammeter is compensated against variations in room temperature. All measurements are valid only for "black-body" radiation or must be converted into it if it is desired to obtain the "true" temperature from the observed "black" temperature.

Full details of this instrument are given in catalog No. 90, which will be supplied on request.

Recovery Stills for Used Cleaning Solvents

Many users of cleaning and degreasing solvents are said not only to be making substantial savings in solvent costs but also to be getting better results from their solvents with the help of a Barnstead Recovery Still. It is stated that this type still returns practically any solvent that is old or dirty back to its original purity for only one or two cents a gallon, making it possible to pay for the still with savings in only a few months—even when as little as 15 gallons of solvents a month are used.



Barnstead solvent recovery still

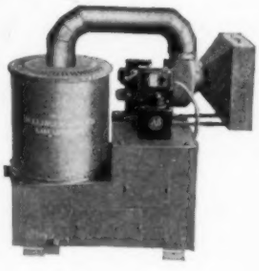
The manufacturers claim that by taking the solvents and running them periodically through their stills they have at all times 100% efficient solvent without having to buy new supplies. Among the many solvents being recovered by this process are carbon tetrachloride, trichlorethylene, ethyl acetate, ether, alcohol, pentachlorethylene, acetone, toluol, benzol, naphthas and others.

The Barnstead Solvent Stills are available for either continuous or batch operation, in a full range of capacities. They may be heated by steam, gas or electricity as desired. Because practically every problem in solvent recovery is different, these stills are more or less made to order of the materials best suited to the particular requirements of the plant. Descriptive literature and full information may be obtained from the Barnstead Still & Sterilizer Company, 168 Lanesville Terrace, Forest Hills, Mass.

Auxiliary Heating Unit for Dryer

The Dellinger Manufacturing Co., 725 N. Prince St., Lancaster, Pa., has recently developed an auxiliary heating unit for attachment to their standard machine. This unit consists of a steam unit heater with connections with the steam line. The air is drawn through it by means of a small electric blower and discharged into the center of the basket in order to provide perfect circulation. Both motors are connected with individual switches ready for outside current.

The attachment is recommended especially for the drying of small parts which are so shaped as to retain excessive water, or where a cold water rinse is used instead of a hot water rinse.



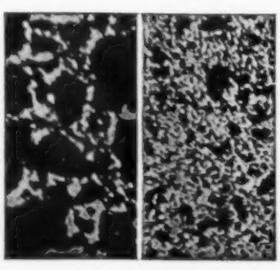
Kreider dryer with auxiliary heating unit

Aluminum Enamel

The Skybryte Company, Cleveland, Ohio, has announced a new aluminum enamel which, according to the manufacturer, sets a new high in beauty, performance and price. It is definitely not made to serve a price market but to meet a need for a more beautiful and durable aluminum finish than has hitherto been available except in baking enamels.

Skyco De Luxe Aluminum Enamel, it is stated, can be sprayed or brushed, has excellent leafing action, sets in one hour, and dries with a brilliant gloss.

The vehicle is said to be a super-resistant liquid reinforced with pure Bakelite. The aluminum content is a new type of Alcoa paste. The micro-photographs (courtesy of The Aluminum Company of America) show the exceeding fineness of the particles in Skyco De Luxe Enamel as compared with the standard particle size.

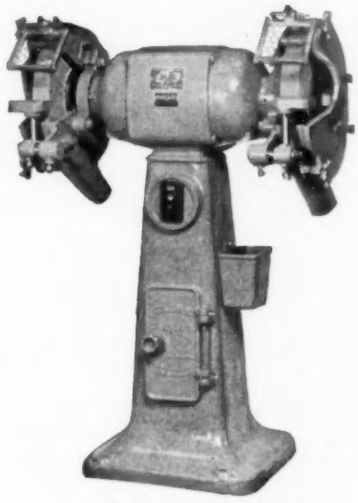


Left. Standard Particle Size

Right. De-Luxe Particle Size

5 HP Electric Grinder

A new 5 H.P. Clark Grinder of the narrow base type for floor mounting is the newest addition to the line of industrial grinding equipment made by the James Clark, Jr. Electric Co. of Louisville, Ky. It is especially designed for heavy duty production work. Standard equipment includes an adjustable hood for wheel wear and the latest type safety switch designed to afford complete protection against overload and under voltage. Steps have been taken in designing this grinder to make the grinding wheel easily accessible to the operator and at the same time provide safe operation.



Clark 5 HP. grinder

Cleaning of Metal Surfaces

A folder has been issued by Hilo Varnish Corp., 42-60 Stewart Ave., Brooklyn, N. Y., entitled Methods Bulletin M-B, Mechanical and Chemical Cleaning Surfaces, for the application of decorative and protective coatings on varnish, enamel, japan, lacquer and synthetics. They point out that certain difficulties which confront some users of finishing materials are due primarily to incorrect methods, and in this bulletin they set forth the fundamentals of practice.

The subject matter is divided into two main groups: (1) material which ordinarily appears on metal surfaces and which must be removed, including inorganic compounds, organic compounds and mixtures of the two; (2) the cleaning of metal surfaces by mechanical means (sand blasting, tumbling or rumbling, rolling, burnishing), and chemical means (solvent washing, degreasing, acid, alkali and electro-chemical). Details are given under each of these divisions.

New Books

Annual Show Schedule for 1938. Published by The Exhibitors Advisory Council, Inc., 330 W. 42nd St., New York. Price $5.00.

The third annual edition of the Show Schedule including all important industrial, trade, commercial exhibits and shows scheduled for 1938 has just been released. Easy reading of the schedule has been made possible by proper classifications by industry and trade groupings. The listing includes international, national, regional, sectional, state and local exhibitions and fairs. It should prove valuable as a guide to companies interested in exhibiting their products. Among the classifications which might be of interest to metal products manufacturers are the following: aircraft; architecture; automobile; chemical; electrical, radio and refrigeration; hardware; industrial—machinery, metals, power and related equipment; marine, motor boat; medical, surgical, dental, health, etc., sportsmen's hobbies.

Introduction to Ferromagnetism, by Francis Bitter. Published by McGraw Hill Book Co. Size 6 x 9, 314 pages, price $4.00.

Since this book, as stated by the author, covers the ground between physics and metallurgy, it should appeal to readers of widely different training. The object is to describe the outstanding properties of ferromagnetic substances and especially to correlate as many of these properties as possible. Contents include the following: General Introduction; Historical Development; About Metals and Alloys; Magnetic Materials and Their Preparation; Internal Fields; Magnetization; Mechanical Deformation; Electrical Phenomena; The Absorption and Evolution of Thermal Energy; Cooperative Phenomena.

Gases in Metals, by C. J. Smithells. Size 5½ x 8½, 218 pages. Price $4.50.

An introduction to the study of gas-metal equilibria, since the behavior of gases and metals in contact with one another is of fundamental importance in many branches of science and industry. The author describes the general principles and brings together under one cover the results of research in various fields on these problems. He emphasizes the intimate connection between the different phenomena.

The work is divided into three broad sections: Adsorption; Diffusion; Solution.

Minerals Year Book for 1937. Published by U. S. Bureau of Mines, Washington, D. C. Size 6 x 9; 1502 pages. For sale by Superintendent of Documents, Washington, D. C. Price $2.25.

The annual compilation of data by the Bureau of Mines on mineral and metal resources and statistics in the U. S., and a review of the metal and mineral industries in 1936. The 1937 volume includes the fundamental statistics formerly carried in the statistical appendix, a feature adding to the convenience of the reader.

Among the sections of special interest to readers of *Metal Industry* are: Secondary Metals by J. P. Dunlop; Nickel and Cobalt by R. J. Lund; Bauxite and Aluminum by H. A. Franke and C. T. Herring; Mercury by H. M. Meyer; Tin by R. B. Miller; Magnesium by H. A. Franke; Antimony and Cadmium by E. W. Pehrson and J. B. Umhau; Platinum and Allied Metals by H. W. Davis; Minor Metals by P. M. Tyler; Copper by J. W. Furness and H. M. Meyer; Lead by E. W. Pehrson and H. M Meyer; Zinc by E. W. Pehrson; Gold and Silver by Chas. W. Henderson and J. P. Dunlop.

Foreman and Apprentice Training. Published by American Foundrymen's Association. Price $1.00. Proceedings of two convention sessions covering four papers and conference discussions.

Job Evaluation and Time-Motion Study and Job Standardization. American Foundrymen's Association. Price $1.00.

Proceedings of one convention session.

Foundry Costs. American Foundrymen's Association. Price $1.00.

Proceedings of the convention session presenting cost methods as applied to gray iron, malleable and non-ferrous industries.

Good Housekeeping and Safety in Foundries; Industrial Codes and Occupational Disease Legislation. Published by American Foundrymen's Association. Size 6 x 9, 61 pages, price $1.50.

THE BIAS BUFF

—is made of a more selective grade of material than the ordinary buff.

—has better workmanship than the average buff.

—gives from 25% to 50% more service than the conventional type buffs.

By the way—why not let us have your inquiries for Work Gloves?

Try BIAS Buffs in your polishing department. Note the efficient work they do—and the extreme economy they show.

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Jersey City
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BIAS Buffs are not cut out but are formed in such a way so that

—each thread in every ply does its full share of work

—and wears slowly and uniformly down to the last ounce of cloth

—these are a few reasons why polishing departments always demand

THE BIAS BUFF

A compilation of the papers and discussions presented before the American Foundrymen's Association Annual Convention in Milwaukee, May 5 and 6, 1937.

Transactions of the Institute of Metals Division. Published by American Institute of Mining & Metallurgical Engineers, 29 W. 39th St., N. Y City. Size 6 x 9, 398 pages. Price $5.00. Volume 124. Papers and discussions presented before the Institute of Metals Division on meetings held in Cleveland, October 20-22, 1936, and New York, February 15-19, 1937.

The volume contains 22 papers including the *Annual Institute of Metals Lecture* by *Prof. R. S. Hutton* of the University of Cambridge on the subject, "*Refractories,*" and a lecture by *Dr. Chas. S. Barrett* of the Metals Research Laboratory, Carnegie Institute of Technology, "*The Stereographic Projection.*"

These papers were reported briefly in METAL INDUSTRY for November 1936 and March 1937.

Transactions of the First International Electrodeposition Conference. Published by Electrodepositors' Technical Society, London, England. Size 6 x 9, over 200 pages. Price 25s.

A bound collection of all the papers and discussions at the First International Conference on Electrodeposition held March 3 and 4 in London. This Conference set a milestone on the path of progress of the electroplating industry. It was reported in *Metal Industry* for May, 1937.

The contents include the following papers:

American Practice in Electroplating, by G. B. Hogaboom

British Electroplating Practice, by E. J. Dobbs.

French Nickel Plating Practice, by M. Ballay

German Electroplating Practice, by Dr. R. Springer

Zinc and Cadmium Plating in the U.S.S.R., by Dr. J. Kronsbein

The Cyanide Cadmium Plating Solution, by G. Soderberg

Chromium Plating from Non-Chromic Acid Solutions with Chromium Anodes, by Prof. M. Schlotter

Electrolytic Coating with Lead Without Immersing in the Electrolyte, by N. P. Fedotieff, B. P. Artamonoff & N. J. Rasmerova

The Adhesion of Electrodeposited Nickel to Nickel, by A. W. Hothersall

A Method of Obtaining Adherent Electrodeposits on Chromium and Stainless Steel, by G. E. Gardam

A Chemical Study of Alkaline Cyanide Degreasing and Coppering Baths, by A. Chaybany

The Etching of Copper by Ferric Chloride Solutions, by B. Baars and L. S. Ornstein

The Crystal Structure of Copper Electrodeposits—Part I, by A. Phillips and W. R. Meyer

Comments on the Electrolysis of Solutions of Complex Salts, by A. Glazunov & M. Schlotter

Inclusions in Electrodeposits, Their Origin and Their Effect on the Structure and Mechanical Properties, by M. Cymboliste

Comparative Properties of Metallic Surfaces Polished Mechanically and Electrolytically, by P. A. Jacquet

The Structure of Thin Coatings of Copper Electrodeposited on Crystalline Copper, by P. A. Jacquet

Optical Research of Thin Layers, by L. S. Ornstein and P. J. Haringhuizen

Developments in the Electrodeposition of the Platinum Metals, by K. Schumpelt

Electrodeposition of Platinum—Historical and General Review, by R. H. Atkinson

Platinum Plating from Alkaline Solutions, by E. C. Davies and A. R. Powell

Modern Developments in the Electrodeposition of Gold, by H. W. J. Pope

A Resume of Silver Plating, by F. C. Mesle

Studies in Evalulating the Brightness of Electrodeposits, by B. Egeberg and N. E. Promisel.

Labor's Road to Plenty, by Allen W. Rucker. Published by L. C. Page and Company. Price $2.50.

A study of the "disastrous effects" not only on the economic life of the country as a whole but on labor itself, of the growth during the last 15 years of arbitrary wage and hour regulation of industry. The author bases his analysis on government data and offers an alternate plan. Table of contents includes the following chapters. The Threat of Permanent Large-Scale Unemployment; What Creates Annual Incomes? What Creates Employment—and Unemployment? Two Obstructions to the Free Working of the American System; Effects of Increasing Burdens on American Industry and Labor; Mythical Benefits of Wage and Hour Regulation in Industry; Failure of Wage and Hour Regulation in Major Industries; Abortive Efforts to Increase Labor's Purchasing Power; Wanted: A Unifying Principle for Sound Labor Relations; A New Basis for Constructive Wage Relationships; Revival of the American System.

Effect of Impurities in Copper, by S. L. Archbutt and W. E. Prytherch. Published by British Non-Ferrous Metals Research Association. Price 12s.6d.

Research Monograph No. 4 giving results

SEND TODAY FOR THE FULL DETAILS

A NEW Money-Saving Method for Quick, Safe Cold Cleaning of dirty Metal Parts

A large metal manufacturer had been using naphtha to remove cutting oil and chips from cast iron parts. Difficulty was experienced in that the castings would load up with grinding compound getting back into fine places.

These parts are now cleaned with MAGNUS No. 78 (a new product), then simply rinsed. Not only is the dangerous fire hazard eliminated, but the parts now come out completely cleaned, and the need of heating in the cleaning operation eliminated, for MAGNUS No. 78 is used at room temperature.

MAGNUS No. 78 is an emulsion degreasing compound for the cold cleaning of metal parts. It removes coatings of dirt, oil, smut or paint by physical action—wetting through and loosening the bond between metal and coating. It eliminates steaming, brushing and wiping and is far better than either soap washing or solvent degreasing alone because it combines these two processes.

It will reduce costs for you.

Special Data Sheets on MAGNUS No. 78 are yours for the asking. Write today for full details.

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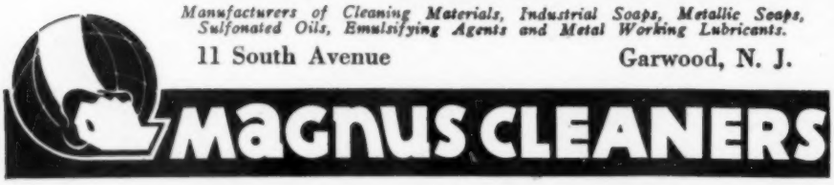
Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants.

11 South Avenue Garwood, N. J.



of the research which was carried out at the National Physical Laboratory in England.

Tin Statistics Yearbook. Published by the International Tin Research & Development Council, 149 Broadway, New York. Size 10½ x 8¼; 200 pages. Price $1.50.

Statistics of production and consumption of tin, including information also which is of use to those who are not especially concerned with tin as a commodity but who realize that the consumption of tin may be regarded as a barometer of world trade in general. Stocks of metal and prices are given for several years and quotas for the various countries participating in the tin control agreement. Consumption figures are included according to the countries and also products, such as tinplate, solder, tin base bearing metals, bronze, collapsible tubes, tinfoil, pewter, type-metal, etc.

Journal of the Institute of Metals of Great Britain. Published by the Institute of Metals, 36 Victoria St., Westminster, London, S.W.1, England. Size 5½ x 8½, 456 pages. Price L1, 11s.6d.

The 60th volume of the Proceedings of the Institute of Metals, the largest published in a number of years. It includes twenty-one pieces of original research covering such subjects as metal spraying; the effect of added elements on aluminum alloys; resistance of bronze to corrosion-fatigue; mechanical properties of lead; rolling properties of zinc; theory of age-hardening; alloys of magnesium; creep of lead, and dental amalgams. Each paper is followed by a full record of the discussions at the recent London meeting and afterward by correspondence.

These papers were reported briefly in METAL INDUSTRY for April, 1937.

Mines Register. 1937 Edition. Successor to Volume XVIII of the Mines Handbook. Size 6 x 9, 1,340 pages. Published by Atlas Publishing Co. Inc., New York. Price $25.00.

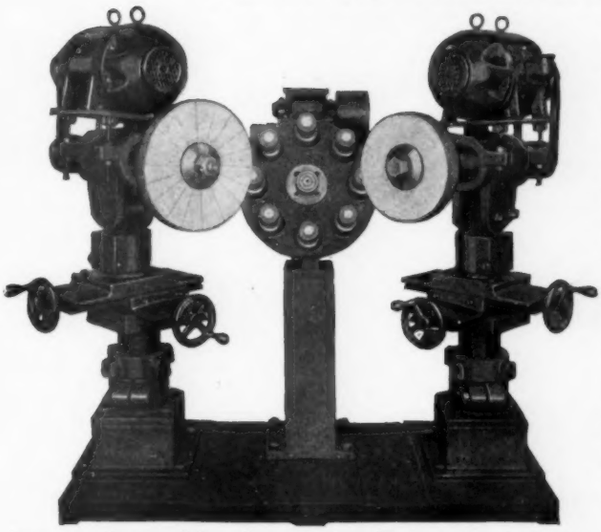
The 1937 edition is a complete revision of the Mines Handbook. More compact and convenient in form, it contains descriptions of more than 4,000 active mining companies and also refers to more than 15,000 inactive ones. Every report contains a detailed history of the company, its predecessors and affiliates, and also gives the financial structure of the company, a description of its mining properties, production and costs, type of equipment used, with the names of the officers and directors, operating executives and purchasing agents. New features include descriptions of some of the leading non-ferrous mining companies in various parts of the world and an enlarged statistical section on non-ferrous metals; an alphabetical list of consulting and mining engineers and operating executives and their companies. Security prices of mining companies listed on important exchanges in the United States and Canada; an extensive buyers guide index for equipment.

The Register should be a very useful aid in keeping abreast of the metal market.

Technical Publications

The "Barbeque" Method of Melting Brass and Aluminum and Its Relation to Defective Castings, by A. Fritschle, sales manager, Federated Metals Division, American

Acme AUTOMATIC TYPE "L-8" 2-Wheel Unit POLISHING AND BUFFING MACHINE



An eight-spindle Automatic Indexing Machine combined with two adjustable lathes, designed to perform two operations in a single loading; such as, cutting down and coloring, polishing and buffing, or to finish parts that require both a face and side wheel contact. It will handle small stampings, die castings and other parts up to 6½" in diameter.

The two spindles opposite the buffing wheels revolve, while the three lower spindles remain stationary for loading. It has a standard indexing speed of 1200 indexings per hour, although some installations are indexing up to 2100 per hour, with slower speed obtained through an adjustment on a cone pulley.

The lathes are V-belt driven and equipped with either three or five H.P. totally enclosed fan-cooled motors, and have all the necessary adjustments for quick set-up and wheel wear. The indexing head is equipped with a ½ H.P. motor.

Chucks used for holding the work are of the automatic grip and release type, allowing the operator ample time to load and properly tend to the wheels.

The machine takes slightly more floor space than an ordinary lathe, and produces savings that pay for itself in a very short time.

SPECIAL MACHINERY AMC AUTOMATIC BUFFING MACHINES

Net weight approximately 650 lbs.
Floor space 24" x 44"

ACME MANUFACTURING COMPANY
DETROIT . . . . . MICHIGAN
BUILDERS OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 25 YEARS

Watch for the January Metal Industry!

The January 1938 issue of METAL INDUSTRY will represent a new departure in our history. This will contain, in a new format, a Review of 1937 and a Preview of 1938, covering the following branches of metal industries.

Metal Fabrication and Rolling
Metal Manufacturing
Electroplating and Metal Polishing
Metal Finishing

These divisions of our industry will be discussed from both the Technological and the Business points of view. The Review and Preview will give a summary of what occurred in 1937, and what seems likely to happen—the Trend of the Times—in 1938.

In addition to this leading feature, the following articles will appear in January.

The Manufacture of Precious Metal Plate for Jewelry, by George Fife, manager, Union Plate & Wire Co., as told to F. A. Westbrook, Mechanical Engineer.

A Study of the Rochelle-Salt Copper Plating Bath, by Dr. A. Kenneth Graham and Harold J. Read. A continuation of this important series.

The Polishing Department of the National Cash Register Company, by E. W. Cochran, foreman, Polishing and Plating Department.

Watch for the January Metal Industry!

This 14 inch over-hang

gives

NEW EASE AND FREEDOM FOR LATHE WORK

The main feature of this polishing lathe, is a 14 inch overhang from the center of the spindle to the front of base.

This exceptional overhang provides much greater freedom in handling the work, especially the larger type pieces.

The base of this lathe is of welded steel construction which permits greater control of the distribution of weight, providing an unusually well balanced unit.

The spindle, due to its position, is exceedingly accessible at all times and by removing a handy steel guard, the motor is, "right up there," where it too can be easily serviced.

This new type Crown lathe will be available in capacities from 2 H.P. to 15 H.P. The weight of these new lathes is substantially heavier than other Crown lathes of similar capacities. This extra weight is entirely in the base construction. For detailed specifications write for new bulletin No. 89.

CROWN RHEOSTAT & SUPPLY CO.

1910 MAYPOLE AVENUE

CHICAGO, ILLINOIS

Smelting and Refining Co., presented at the Regional Conference of the St. Louis District Chapter American Foundrymen's Association, held at the Missouri School of Mines and Metallurgy, Rolla, Mo., October 8 and 9, 1937.

The Barbeque method consists of placing part of the metal charge—ingots, gates, sprues and misrun castings—on the lid of the furnace in order to pre-heat them. Very often the furnace flame comes in contact with these parts contaminating them badly with harmful gases which later go into the melt and spoil the casting. Pre-heating should be done away from the flame.

Red brass and tin bronze should be deoxidized before pulling the crucible from the furnace. Phosphor copper is recommended, but caution is necessary, not to add too much. Phosphor copper should be plunged immediately to the bottom of the molten metal and stirred vigorously. Zinc will be useful if added in the quantity 3 to 8 ounces per 100 pounds of metal charge, according to the alloy, to the molten metal in the furnace about 8 to 10 minutes before pulling the crucible. Zinc should also be plunged to the bottom of the molten metal and stirred vigorously. Phosphor-copper should also be added 4 to 5 minutes before pulling the crucible or tapping the metal from the furnace. Phosphor copper should not be placed in the bottom of the crucible with the cold metal charge.

For deoxidizing yellow brass, silicon-copper is recommended; also manganese-copper, 2 to 3 ounces per 100 pounds of metal, about 10 minutes before pouring off; followed about 5 minutes later by 1 to 1½ ounces of phosphor-copper. For certain types of work like gas cocks and valves, 2 to 3 ounces of phosphor-copper can be used.

There is no reason to use gates or sprues as coolers when the molten metal is too hot. The best practice is not to overheat; but when necessary to bring the metal out somewhat on the hot side, it is best to allow the crucible to stand for a little while after pouring the light castings until it has cooled sufficiently, and stir at intervals of 3 or 4 seconds, to have uniform distribution of heat in the metal. The use of coolers often results in cold-shuts; always adds time and expense to the melting operations.

A Plane Bending Apparatus with Interferometer Strain Recorder for Metallurgical Investigations, by J. W. Cuthbertson, Series A. No. 60. Technical Publication of the International Tin Research and Development Council, 149 Broadway, New York.

Nickel and Nickel-Base Alloys; their use in the design of corrosion resistant machinery and equipment. Chemical composition; physical constants; mechanical properties; effects of temperature; creep data; available mill forms; corrosion resisting characteristics of nickel, Monel, Inconel, Hastelloy alloys and Illium. International Nickel Company, Inc., 67 Wall St., New York.

Design and Construction of Heavy Equipment in Monel, Nickel and Inconel. Production methods; hot rolled plate and shapes; design formulae; jacketed; vessels; rivets and riveted joints; welding; heating and hot working; seamless drawn nickel tubing; recommended welding rods and fluxes. International Nickel Company, Inc., 67 Wall St., New York.

Mechanical Properties of Some Tin Bronzes, by *Dr. Ing. H. Lepp.* Series D No. 3. Technical Publication, International Tin Research and Development Council, 149 Broadway, New York.

Engineering Curricula Accredited by Engineers' Council; as of October 1, 1937, including statement of objectives and procedures. Engineers' Council for Professional Development, 29 W. 39th St., N. Y. City.

Variation in Thickness of the Tin Coating of Tinplate, and its Effect on Porosity, by *W. E. Hoare.* Series A. No. 59. Technical Publication of International Tin Research & Development Council, 149 Broadway, N. Y.

Fence Test Progress and Fencing Problems. A report of tests on fence made of copper bearing steel, galvanized steel lead covered and copper clad wires, etc. Agricultural Engineering, October 1937. American Society of Agricultural Engineers, St. Joseph, Mich.

Government Publications

Proposed Trade Practice Rules for Radio Receiving Set Manufacturing Industry. Federal Trade Commission, Washington, D. C.

Associations and Societies

American Electro-Platers' Society

90 MAYNARD ST., SPRINGFIELD, MASS.

Plans are well under way for the 26th Annual Convention—1938—of the A.E.S., to be held in Milwaukee, Wisc., June 13-16, 1938. Committees have been appointed and are actively at work even at this early date. This speaks well for the convention. Milwaukee is making its goal "The Best Ever."

Convention Committee

R. M. Goodsell, 723 Lathrop Ave., Racine, Wisc., general chairman.

Robert Steurnagel, 1508 W. Concordia Ave., Milwaukee, Wisc., treasurer.

A. J. Hermansen, 3266 N. 2nd St., Milwaukee, Wisc., secretary.

Committee Chairmen

R. B. Goodsell, 2901-21st St., Racine, Wisc., Publicity.

Phil J. Ritzenthaler, 5408 W. Cherry St., Milwaukee, Wisc., General Program.

Jack Geissman, 2923 N. 45th St., Milwaukee, Wisc., Entertainment and Recreation.

Claude A. Terrill, 4123 N. 25th St., Milwaukee, Wisc., Hotel and Reservations.

John Miszeweki, Jr., 2544A. N. Bremen St., Milwaukee, Wisc., Shop Visitation.

Vincent Sheehan, 3035 W. Wisconsin Ave., Apt. 401, Milwaukee, Wisc., Educational.

Dexter Rhodes, 3912 W. Villard Ave., Milwaukee, Wisc., Registration.

Frank J. Marx, 1431 Cherry St., Milwaukee, Wisc., Banquet.

Joseph Bykowski, 2762 N. Sherman Blvd., Milwaukee, Wisc., Transportation.

Henry Bornitzke, 2602 N. 50th St., Milwaukee, Wisc., Exhibits.

Dan Wittig, 1221 N. 3rd St., Milwaukee, Wisc., Advisory.

Philadelphia Branch, A. E. S.

SECRETARY, R. E. JACKSON, JR., 125 E. ALLEN ST.

The annual banquet and open meeting of the Philadelphia Branch was held at Adams, 13th and Spring Garden Streets, on Saturday, November 20th. The meeting took over the whole building which allowed plenty of room for the education sessions and social affairs.

The educational program which began at 2 P.M. included the following papers:

The pH of Alkaline Plating Solutions, by George B. Hogaboom, electroplating engineer, Hanson-Van Winkle-Munning Co., Matawan, N. J.

Magnetic Methods for Measuring the Thickness of Plated Coatings on Steel, by A. Brenner, U. S. Bureau of Standards, Washington, D. C.

The Rochelle Salt Copper Bath, by Dr. A. Kenneth Graham of the A. Kenneth Graham and Associates, chemical engineers and consultants, Jenkintown, Pa.

Question Box, by Oliver J. Sizelove, electroplating engineer, Frederick Gumm Chemical Co., Kearny, N. J.

The banquet which took place at 7 P.M. included special entertainment by *Andy A. Arcari*, accordionist who also led the singing. Numerous door prizes were awarded and the method of running them off was highly efficient, the awards being made after the members and guests had finished eating but while they were still at the tables so that there was no time lag before the tables were cleared. These festivities were followed by dancing with the music supplied by the Pennsylvania Clivedens, one of the most prominent orchestras in Philadelphia.

Needless to say the party was a huge success.

Detroit Branch, A. E. S.

SECRETARY, THEODORE C. EICHSTAEDT, 679 VIRGINIA PARK

The annual open meeting and banquet of the Detroit Branch was held at the Statler Hotel. The educational session which began at 1 P.M. included the following papers:

The Value of Electroplating Researches to the Manufacturing Industry, by Dr. William Blum, National Bureau of Standards, Washington, D. C.

The Value of Thickness of Electro-deposited Coatings, by George B. Hogaboom, Hanson-Van Winkle-Munning Co., Matawan, N. J.

Preparation or Cleaning of Metals Prior to Plating, by Prof. Edwin M. Baker, Dept. of Chemical Engineering, University of Michigan, Ann Arbor, Mich.

Practical Methods for the Disposal of Alkali and Metal Cyanide Solutions by Floyd F. Oplinger, R & H Chemical Dept., E. I. duPont de Nemours & Co., Niagara Fall, N. Y.

Springfield Branch

SECRETARY, H. DELARM, 330 PLAINFIELD ST., SPRINGFIELD, MASS.

The Annual open Educational Meeting and Banquet was held Saturday, November 20, at the Highland Hotel. The educational session which began at 2 P. M. included the following papers:

Cyanide Copper Plating, by Walter R. Meyer, General Electric Co., Bridgeport, Conn.

Practical Methods for the Disposal of Alkali and Metal Cyanide Solutions, by F. F. Oplinger, R & H Chemicals Dept., E. I. duPont de Nemours & Co.

Specialization of Finishes and Its Effect on the Work of the Electroplater, by Gustav Klinkenstein, Maas & Waldstein Co.

The banquet began at 7 P. M. and was followed by entertainment and dancing. Both sessions and the banquet were very well attended and the entertainment and dancing were hugely enjoyed.

American Foundrymen's Association

222 W. ADAMS ST., CHICAGO, ILL.

The 42nd Annual Convention ot the American Foundrymen's Association, will be held in the Public Auditorium, Cleveland, Ohio, May 14-19, 1938. Applications for space are now being received. Details of the program and other arrangements will be made public at an early date.

A joint conference of the American Foundrymen's Association and Cornell University, was held at Willard Straight Hall, Cornell University, Ithaca, N. Y., November 26th and 27th. The attendance included operating foundrymen, metallurgists and others from northern New York, Ohio, Pennsylvania and New England. A feature of the sessions was the inspection of the shops and laboratories of Cornell University. Among the papers read were the following:

Mixing and Blending of Foundry Sands (Iron, Steel and Non-Ferrous) by L. B. Knight, Jr., vice-president, National Engineering Co., Chicago.

Facing Mixtures for Gray Iron, Malleable, Steel and Non-Ferrous Castings, by Norman Dunbeck, Eastern Clay Products, Inc., Eifort, Ohio.

The Role of Silicon in Non-Ferrous Castings, by H. W. Gillett, Technical Advisor, Battelle Memorial Institute, Columbus, Ohio.

Laboratory Demonstrations included Materials Testing, Microscopic Examination of Cast Metals, High Temperature Testing of Foundry Sands, Crystallization Demonstration and Photo-Elastic Demonstration.

Connecticut Non-Ferrous Foundrymen's Association

SECRETARY, LOUIS G. TARANTINO, 670 W. JACKSON AVE.

This association held its meeting Tuesday evening, Nov. 16, 1937 at the Hotel Duncan, New Haven, Conn. with T. Joseph Judge, the President presiding, and a large attendance present.

The subject of the meeting was "*Effect of Impurities in Red Brass and Methods of Determination.*" The Foundry Practice Phase of the subject was headed by *David Tamor* of the *American Chain Co., Reading Pratt & Cady Division*, Hartford, Conn. The technical phase of the meeting was led by *Paul A. Leichtle* of the *Chase Brass & Copper Co.*, Waterbury, who illustrated the assistance available to the chemist in analytical work by means of the spectrograph.

The next meeting will be held December 21st at the Hotel Duncan, New Haven, Conn. and *George Belknap* of the *Belknap Mfg. Co.* of Bridgeport will address the meeting on "*Cores & Core Blowing.*"

National Safety Council

20 N. WACKER DRIVE, CHICAGO, ILL.

The National Safety Council's Executive Committee has named seven vice-presidents and a managing director to serve with President *D. D. Fennell*, Consulting Engineer of Chicago. *W. H. Cameron*, was re-elected Managing Director of the Council. He has held this position since the Council was founded in 1913.

Personals

Joseph Haas

Joseph Haas was recently appointed superintendent of one of the plants of the Bassick Company, Bridgeport, Conn., manufacturers of casters and furniture hardware.

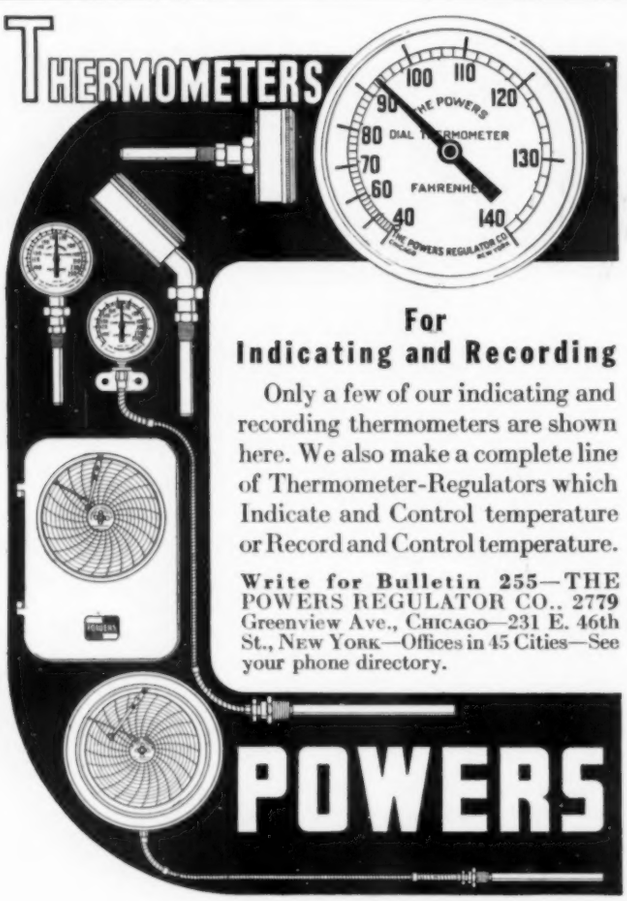
Mr. Haas has for a long time been widely known in the electroplating and metal finishing industries, having been a frequent contributor to METAL INDUSTRY and an active member of the American Electro-Platers' Society. He was for many years engaged directly in plating operations and held the position of foreman plater in a number of important plants in and around New York. Some years ago he moved to Muncie, Ind., to take the position of assistant superintendent of manufacturing and time study for the Ontario Silver Company. After years with this company he returned to New York to take charge of the plant of Francis Keil & Son, 401 E. 163rd St., New York, as factory manager. Several months ago he went with the Norwalk Lock Co., S. Norwalk, Conn., as production superintendent and from there to the Bassick Company.

JOSEPH HAAS

At a meeting of the Springfield, Mass., branch of the American Electro-Platers' Society, held at Springfield on November 20, an address on "*The Specialization of Finishes and Its Effect on the Work of the Electro-plater*" was given by *Gustave Klinkenstein*, Vice-President and Technical Director, of Maas & Waldstein Co., makers of industrial finishes, Newark, N. J. *Mr. Klinkenstein* reviewed the rapid developments that have taken place in the finishing industry during the past few years and called attention to the number of highly specialized finishes that are now being produced for use on specific jobs. He stated that finishes are now being designed for products made of each metal and alloy employed as raw materials and that these finishes are modified to suit the varing kinds of service in which the products are used. "One of the chief effects of the specialization of finishes on the work of the electro-plater is to provide him with means of doing better and more profitable work," said Mr. Klinkenstein.

H. Sidney Smith, consulting engineer for the *Union Carbide Co.*, 30 E. 42nd St., N. Y. City, was awarded the *James Turner Morehead Medal*, for the year 1936, by the *International Acetylene Association*, for his "vision, inspirational guidance and aggressive cooperation in the advancement of the acetylene industry." Mr. Smith was also the recipient of the *Samuel Wylie Miller Medal* awarded by the American Welding Society, at its recent meeting in Atlantic City in connection with the National Metal Congress.

Dr. Louis Weisberg, consulting chemical engineer, 71 West 45th St., New York, gave a talk on plating at the meeting of the New York section of the *American Institute of Chemical Engineers* on November 9th. Dr. Weisberg is also scheduled to speak on bright nickel before the New Haven chapter of the American Electro-Platers' Society on May 3rd.



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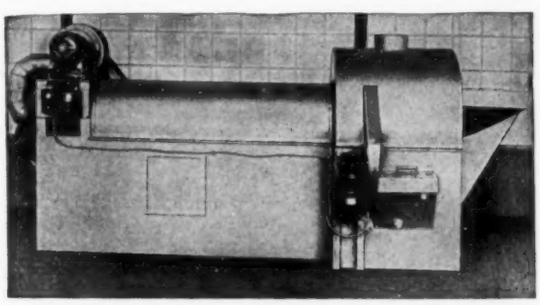

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Obituaries

Edward N. Boice

Edward N. Boice, treasurer of the Hanson-Van Winkle-Munning Company, Matawan, N. J., passed away Saturday evening, November 6, 1937.

Edward N. Boice was born on August 4, 1877. He first entered the employ of the Hanson and Van Winkle Company, then in Newark, N. J. in the fall of 1892 as an office boy. He became bookkeeper in 1896 and held that post until about 1900, when he became purchasing agent and also continued as bookkeeper.

After the death of Abraham Van Winkle in 1915, Mr Boice was given the post of

EDWARD N. BOICE

treasurer of the Company which he held until the merger of the Hanson and Van Winkle Co. with the A. P. Munning Company in 1927 to form the Hanson-Van Winkle-Munning Co.

Upon the formation of this combination, the largest organization in the history of the electroplating equipment and supply industry, Mr. Boice was made secretary and

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF MARCH 3, 1933, of THE METAL INDUSTRY, published monthly at New York, N. Y., for October 1, 1937, State of New York, County of New York, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Thos. A. Trumbour, who, having been duly sworn according to law, deposes and says that he is the Business Manager of METAL INDUSTRY and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Metal Industry Publishing Co., Inc., 116 John Street, N. Y. Editor, L. J. Langdon, 116 John Street, N. Y., Managing Editor, Adolph Bregman, 116 John Street, N. Y. Business Manager, Thos. A. Trumbour, 116 John Street, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) The Metal Industry Publishing Co., Inc., 116 John Street, N. Y.; L. J. Langdon, 116 John Street, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) L. J. Langdon, 116 John Street, N. Y.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

THOS. A. TRUMBOUR, Business Manager.

Sworn to and subscribed before me this 8th day of October, 1937.

(Seal) GEO. H. PRESCOTT
Notary Public, Queens County
Certificate filed in Queens County No. 1316
Queens County Register's Off. No. 856
Cert. filed in N. Y. C. No. 28
Cert. filed in N. Y. Reg. Off. No. 8-P-29
Commission Expires March 30, 1938.

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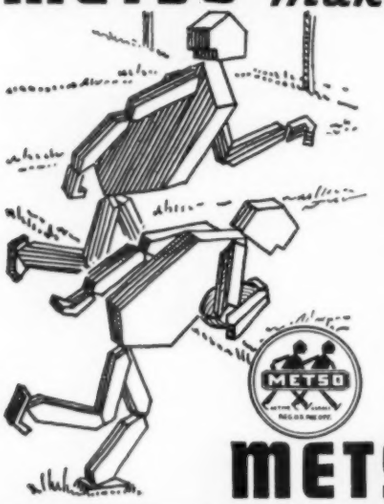

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also served as sales manager for a short time. He continued in the position of secretary until 1930 when he was made treasurer, which position he held up to the time of his death.

Mr. Boice was nationally known throughout the industry. He had friends in every place where electroplating is practiced. His kindly, genial personality made him welcome everywhere. He was very active in the old Metal Finishers Equipment Association for a number of years.

Mr. Boice was a member of the Kane Lodge of Masons in Newark, N. J. He is survived by his wife, mother, sister and three brothers.

Harry M. Riddle

Harry M. Riddle, who passed away on September 29 at the age of 72, was president of the Asbury Graphite Mills, Asbury, N. J. This firm was founded in 1895, and is one of the largest importers and refiners of graphite in the United States. Mr. Riddle was also president of the First National Bank of Washington, N. J., a member of the Agricultural Committee of the American Bankers' Association, also Postmaster of Asbury, which position he held since 1897. He was the third oldest postmaster in years of service in the United States.

H. Lamson Scovill

H. Lamson Scovill died recently of a heart ailment at his home in Madison, N. J., at the age of 56. Mr. Scovill was president of the Oiljak Manufacturing Co. of Montclair, and a director of the Scovill Mfg. Co., Waterbury, Conn., a business founded by his grandfather, James Mitchell Lamson Scovill.

Surviving are his widow, a daughter, *Mrs. Godfrey S. Beresford* of Madison; two sons, *Henry William Scovill 2nd* of Madison, N. J. and *Lamson M. Scovill* of Waterbury, his mother, *Mrs. Ellen Hyde Scovill*, and a sister, *Miss Margaret Scovill*, both of Watertown, Conn.

J. Sterling Place

Below is a recent portrait of the late J. Sterling Place, vice-president of the Hudson Smelting & Refining Co., Newark, N. J.

J. STERLING PLACE

A report of Mr. Place's death, which was caused by an automobile accident, was published in our November issue, p. 592.

Thomas Allsop

Thomas Allsop, president, Philadelphia Drying Machinery Co., Philadelphia, Pa., died September 24th at the age of 71.

Harold C. Beecher

Harold C. Beecher, assistant production manager of the American Brass Co., Waterbury, Conn., died of a heart attack at his home in Waterbury, on Oct. 8, aged 59 years. He went to Kenosha, Wisc., in 1906, to become superintendent of the main works of the company, remaining in charge until transferred to the head office in Waterbury in 1930. During a quarter of a century of residence in Kenosha, Mr. Beecher was prominent in civic and fraternal activities.

Mrs. Margaret Gumm

Mrs. Margaret Gumm, wife of Frederick Gumm, of the Frederick Gumm Chemical Co., Kearny, N. J., died on Nov. 27, 1937. She had undergone an operation and contracted pneumonia which she was too weak to resist. She leaves two children, Ruth and John.

Our heartfelt sympathy goes out to Mr. Gumm.

John G. Collins

John G. Collins, Vice President of the National Alloys Company of Detroit, Michigan, died suddenly at his home in Detroit on October 28, 1937.

Mr. Collins had been associated with the National Alloys Company since its organization. He was formerly with the Westinghouse Electric Company, East Pittsburgh, Pa., and the Aluminum Company of America at Detroit.

Mr. Collins belonged to one of the pioneer families of Pittsburgh, Pa., and had many friends in that city. He was interested in many ways in the advancement of the nonferrous alloys industry, and had been associated with Mr. W. J. Reardon for the past 26 years.

JOHN G. COLLINS

Christmas Greetings!

AS another year draws to a close, we extend to you our best wishes for the Christmas season and for the New Year.

We are appreciative of your friendship and of the patronage you have given us. We pledge our best efforts to make MATCHLESS PRODUCTS and MATCHLESS SERVICE of even greater value to you.

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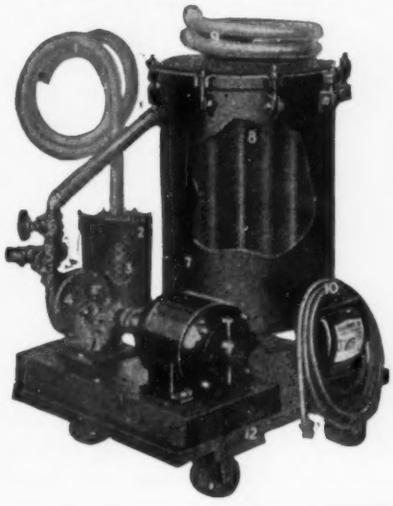

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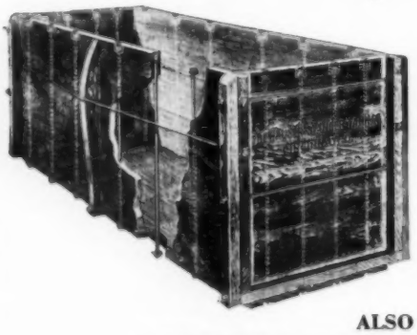

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News From Field Correspondents

Waterbury, Conn.

November 19, 1937.

Industrial conditions in the city have declined to the lowest level since 1933, according to officials of the *American Brass Co.*, *Scovill Mfg. Co.* and *Chase Brass & Copper Co.* While it is reported that three to four hundred employees have been laid off in the last month, the officials say that the number laid off has been few, and that they have endeavored to stretch the work out as much as possible even to the extent of shortening hours, in some cases, to 15 a week, in order to keep as many at work as possible.

D. F. Hollister, vice president of the *American Brass Co.* says that the orders now being received are about 50 per cent of normal. The decline started four months ago, he said. Similar statements were made by *Rodney Chase*, assistant secretary of the *Chase Brass & Copper Co.* and by *John H. Goss*, vice president of the *Scovill Mfg. Co.*

Reports of wholesale lay-offs at the *Waterbury Clock Co.* are denied by Vice Pres. *Charles H. Granger*, who says not more than 50 have been laid off in the last few weeks.

More than 50 employees of the *Chase Brass & Copper Co.* who have been with the company 20 years or more were given a dinner by the company this month. One had 50 years of service, six had more than 40 years service and 15 had more than 30 years service.—W. R. B.

Connecticut Notes

November 19, 1937.

BRIDGEPORT.—The local assembly plant of the *Underwood-Elliott-Fisher Co.* is now on a four-day week basis. The manufacturing departments were shut down entirely on Oct. 1.

The *General Shaver Corp.* has had to add a third shift as a result of demands for its new razor.

Jenkins Bros. is planning an addition to its foundry.

MERIDEN.—Employment in the 25 principal factories amounted to 7,228 in September, an increase of 16 per cent over last September. Average weekly payrolls amounted to $196,907, a gain of 31 per cent.

TORRINGTON.—Fire of unknown origin destroyed the plant of the *Colonial Bronze Co.*, Nov. 9. The loss is estimated at $30,000.

TERRYVILLE.—The *Andrew Terry Co.* is building a two-story addition, 40 by 60 feet to be used as a core room.

NORWALK.—Payrolls in the principal factories here averaged $225,596 during October, the highest since 1929.

The *Segal Lock & Hardware Co.* reports a 16 per cent gain in shipments for the first nine months of the year, compared with the same period last year.—W. R. B.

Newark, N. J.

The *Industrial Equipment Co.* with factories in Newark and East Orange, has leased the plant of the *Superior Welding Co., Inc.* on Murray Street and will consolidate business at the Newark plant. The company will make some improvements to the plant.

The CIO has filed a complaint with the National Labor Relations Board charging the *Aluminum Company of America* with "intimidation and coercion of employees" in the formation of an independent union at its plant at Edgewater.

Following Newark concerns have been incorporated: *Foglite, Inc.*, electrical devices, $1,750 preferred Series A, $100,000 series B, and 1,000 shares common, no par.—C.A.L.

Trenton, N. J.

Some of the Trenton metal industry plants report that business has shown a little decline during the past month while others continue with a normal output. The State Department of Labor announced that twenty-four plans calling for expenditure of $2,350,000 were approved for industrial construction in New Jersey during September.

Following concerns have been incorporated here: *Defiance Metals Corp.*, Camden, 2,500 shares, no par; *Paterson Brass Mfg. Co., Inc.*, Paterson, 90 shares, no par; *Barvia Co., Inc.*, metal products, Paterson, $50,000. —C. A. L.

Detroit, Mich.

Production in all lines of the non-ferrous metals is slow in getting into peak schedules. All the big plants are active, but they just do not get back where they should be at this time of the year.

Some leaders in the industry go so far as to say present conditions may drag along through the remainder of the fall and through the winter. This is not a general feeling, however, and it is apparent the majority of industrial forecasters believe the motor car industry particularly, will be back in its old-time strides within the next month or so.

The accessory plants are moving along at about the same rate as the main automobile plants. Practically all are in production but are not speeding up in their usual way.

Manufacturers of refrigeration units are operating steadily and no doubt would be doing much better if general business conditions were more settled. The outlook in this line, however, is favorable for continued activity throughout the winter.

Production of plumbing and heating supplies is moving along at a steady pace, but there is nothing outstanding.

The *Parker Rust Proof Company* is erecting a new building for additional office space and laboratory facilities on East Milwaukee Avenue. It is adjacent to the present structure, two stories high and extending 148 feet along the avenue. The present service, research and testing laboratories with a personnel of 35 graduate chemists, the new legal and engineering departments and the enlarged general office force, made this improvement necessary.

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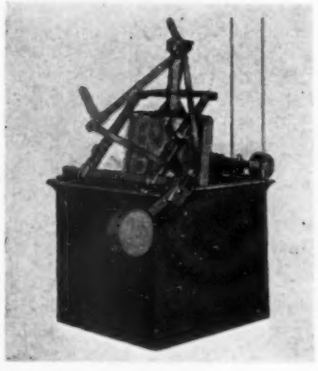
DANIELS PLATING MACHINES Patent No. 1936382

Designed to reduce the cost of plating small articles in bulk



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THE machine is built strong and operates rapidly due to a novel feature in the designing of the conductor frame. The frame has a four point contact so placed in the bottom of the container that the current is equally distributed to all articles being plated. The result is a uniform deposit; eliminates the depositing or treeing of metal on any part of the machine.

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129 Oliver Street, Newark, N. J.

CLEPO *Not just a cleaning compound but a*
Scientific Cleaner Service . . .

Metal Cleaning is a simple matter when everything is right. But everything is right only when the cleaning operation begins where the cleaning compound is made, and ends in your plant through the medium of unremitting service by the maker of the compound. CLEPO cleaning compounds are sold on that basis.
CLEPO service does not consist simply of leaving you with a quantity of chemical. It includes a definite effort to aid you in fitting the right cleaner to each job in your plant. We believe this method is the only means by which you can reduce rejects to the barest minimum and eliminate blistered or peeled deposits, or other defects caused by improper cleaning.
CLEPO cleaners do this because they are scientifically compounded of high purity chemicals; always uniform; always supported by CLEPO service.

FREDERIC GUMM CHEMICAL CO., INC.
538-542 FOREST STREET KEARNY, NEW JERSEY
TECHNICAL ADVISORS and SALES REPRESENTATIVES
OLIVER J. SIZELOVE, General Technical Advisor and Sales Representative
WILLIAM VOSS — JACOB HAY — GEORGE GEHLING
METROPOLITAN — WESTERN — PHILADELPHIA

Following an agreement between officials of the company and the *United Auto Workers' Union*, employees of a unit of the *Bohn Aluminum & Brass Corpn.*, 3516 Hart Avenue, are back at work again after a short strike that upset production schedules for a few days. The dispute, it is stated, involved the employment status of 20 men in relation to the new state law concerning occupational diseases. It is understood the Union agreed to abide by a decision of the National Labor Relations Board concerning the matter.

Labor troubles continue to break out now and then in the big motor car plants. Thus far they have been adjusted without much difficulty. Most of the trouble is attributed to working disputes, although in some instances they have resulted from increased wage demands.—F. J. H.

Los Angeles, Calif.

Western Insulated Wire, Inc., is a new concern to make wire at 1001 East 62d St. *A. D. Nast* is president.

Planett & Co. of Oakland, manufacturers of all kinds of wire and wire goods, have opened a branch factory here at 1701 North Spring St.

The *Fog Nozzle Co.*, manufacturing small fire fighting apparatus, have taken larger quarters at 1520 East Slauson Ave.

The *Northill Co.* is a new firm at 700 South Labrea Ave., to make various aeronautic devices and equipment.

D. H. Bowlzer Co. are making a new type water faucet at 5332 Dean Ave.

The *Hanan Safety Lock Co.* are making window locks that can not be opened by burglars.

The *Zig Zag Fastener Co.* at 1650 South Normandie Ave. are making metal fasteners.

The *Pasadena Sprinkler Co.* have enlarged their factory at 29 East Union St., Pasadena, *J. F. O'Hanlon*, owner.

Mazzi & Fletcher are making lamps and shades at 3688 South Main St.

The *Utility Fan & Mfg. Co.* have taken another building and doubled the space at 2520 Santa Fe Ave.

The *Sharpe Mfg. Co.* making air compressors and paint equipment, have moved to 1124 Wall St.

The *H. G. Landis Co.* at 167 East 42d St., are making a new house gas heater, giving out no monoxide gas.

The *National Heating & Engineering Co.*, San Diego, are making a gas fired winter air conditioner, which has a blower and thermostat.

The *Koloaire Utilities Co.* of 3747 Wilshire Blvd., *H. S. Cornish*, engineer, have started making dry ice converters for soda fountains, or for auto for long hiking trips, etc.

Abbey-Scherer Co. of Elmonte have started making tennis nets of galvanized steel wire, crimped and interwoven.

The *Standard Highway Illuminating Co.* of 716 South Berendo St., are making neon markers for highways, *Oscar W. Nystuen*, president.

The *Carling-Larrabee Co.* of Hollywood, are making metal ash trays.

The *Ensign Carburetor Co.* of Huntington Park, are making a new carburetor which can be used for manufactured or natural gas or butane.

The *Lyons Metal Products Co.* of Aurora, Ill., have opened Pacific Coast office here.

Alexander Cross is a new manufacturing jeweler at 315 West 5th St.

G. Terranova has opened a shop to make jewelry at 220 West 5th St.

The *Lighting Equipment & Supply Co.* will make lighting fixtures at 333 South San Pedro St.

The *Consolidated Novelty Co.* will manufacture vending machines at 2038 East 1st St.

Ernest D. Engelland has enlarged his jewelry making shop at 315 West 5th St.

—H. S.

Verified Business Items

Continental Machine Specialties, Inc., 1301 Washington Ave. S., Minneapolis, Minn., announce a prize contest for unusual accomplishments through the use of narrow continuous motion precision saws and files, a comparatively new method of machining. The first prize $100, second prize $50, and a number of additional smaller prizes will be

Whether it's a heavy-duty job, or delicate jewelry finishing . . .

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SAVES *time*

SAVES *material*

Recommended by 50 years of brilliant service on the most varied and exacting cleaning jobs.

Not the cheapest . . .
but *cheapest in the long run!*

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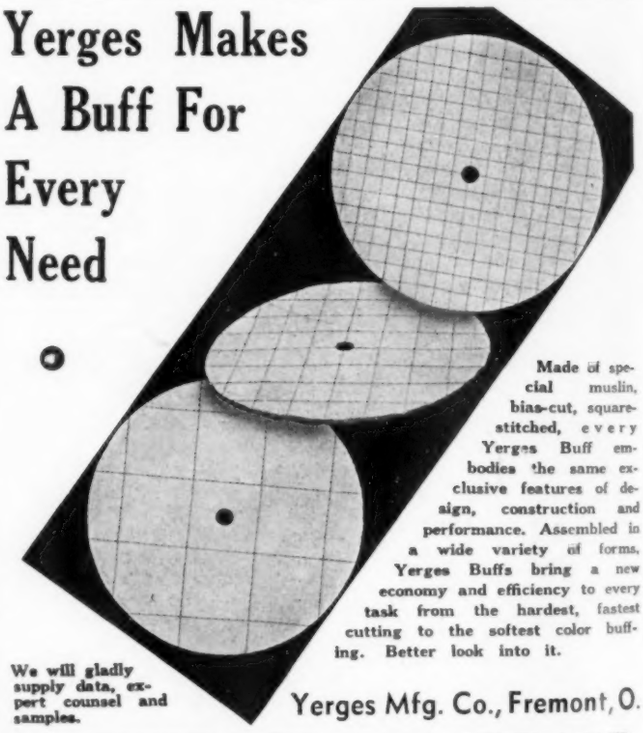
RUMFORD CHEMICAL WORKS
RUMFORD, RHODE ISLAND

Yerges Makes A Buff For Every Need



Made of special muslin, bias-cut, square-stitched, every Yerges Buff embodies the same exclusive features of design, construction and performance. Assembled in a wide variety of forms, Yerges Buffs bring a new economy and efficiency to every task from the hardest, fastest cutting to the softest color buffing. Better look into it.

We will gladly supply data, expert counsel and samples.

Yerges Mfg. Co., Fremont, O.

YERGES

given. Full details regarding the contest can be obtained from the company at the address given above.

Associated Auctioneers, Inc., 1915-19 Chestnut St., Philadelphia, Pa., will hold an auction (Trustees' Sale in Liquidation) of the machinery and equipment of the Girard Smelting & Refining Co., Milnor and Bleigh Sts., Tacony, Philadelphia, on Wednesday and Thursday, December 8th and 9th. The sale will start at 10 A.M. on the premises. It will include all of the machinery and equipment for smelting and refining scrap, secondary, waste materials, drosses, etc., of red and white metals, including furnaces, melting pots, shears, compressors, welding machine, baling presses, magnets, boiler, pump, complete machine shop, auto trucks and garage equipment, complete laboratory, office equipment, etc.

Philip Sievering, Inc., 199 Lafayette St., New York, announce that they are now in full production in their new department devoted to "Electrocolor," the new method of producing colors on metals. This company is among the first to be granted a license by *United Chromium, Inc.*, 51 E. 42nd St., New York. "Electrocolor" was described in METAL INDUSTRY, October, 1937, pages 503-4.

Standard Plating Works, Inc., 1617-27 North St., Philadelphia, Pa., have acquired property on Olney Ave., Olney, for a one-story plant for which contract will be let. The cost will be over $50,000 with equipment. On completion the present plant will be removed to the new location where capacity will be increased. Departments: tinning, polishing and buffing, electroplating.

Johnson Bronze Co., New Castle, Pa., has appointed *Connell-Roper Inc.*, 2816 Commerce St., Dallas, Tex., as sales representatives. Departments: bronze foundry; brass machine shop, tool room.

Arthur A. Crafts & Co., 532 Commonwealth Ave., Boston, Mass., have leased space in building at 17 Williams St., Newark, N. J., for a branch plant. The company manufactures jewelers' machinery and parts, engraving points, industrial diamonds, etc.

Cuno Engineering Co., Meriden, Conn., has asked bids on general contract for a two-story and basement addition, 42 x 97 ft., to cost about $50,000 with equipment. The new building will furnish room for enlarged engineering and research departments and to provide suitable erecting floor for large industrial filter units. Departments: tool room, stamping, polishing and buffing.

Crescent Insulated Wire & Cable Co. Inc., 319 N. Alden Ave., Trenton, N. J., has let general contract for a one-story addition. Cost over $50,000 with equipment.

Hanson-Van Winkle-Munning Co., Matawan, N. J. and Anderson, Ind., is pleased to announce the appointment of The *Chamberlain Co., Inc.*, 2550 E. Olympic Blvd., Los Angeles, Calif., as distributor for Hanson-Van Winkle-Munning Co. products in southern California. The Chamberlain Co. is carrying a complete stock of supplies for the plating industry. Hanson-Van Winkle-Munning Co. is the oldest and largest organization in the metal finishing equipment and supply industry. The Chamberlain Co. was established in 1898 and has been in business continuously since that date. *Jack D. Clayton*, formerly representing the Hanson-Van Winkle-Munning Co. in Detroit, is acting as Sales Representative for The Chamberlain Co., Plating Supplies Division, in southern California.

The *Hammond Machinery Builders*, Kalamazoo, Michigan, announce the appointment of *W. J. Bach*, 1400 Tenth Place, So. Birmingham, Ala. as their representative in the sale of Grinders for Foundry use. Mr. Bach covers the states of Tennessee, Georgia, Alabama, Florida, Louisiana, N. Carolina, S. Carolina.

Claude B. Schneible Co., 3951 Lawrence Ave., Chicago, Ill., announces several personnel changes. *Hugo Kurowske* has become Sales Manager. *L. C. Beers*, formerly in the southern territory, has been designated New England District Manager, and now has headquarters at Springfield, Mass. *Carl Herman* of Philadelphia will henceforth be in charge of sales in the New Jersey and New York Metropolitan area, retaining his office at Philadelphia. *Noyes C. French*, Ohio representative at Cleveland, has taken over additional sales territory including part of

HAUSFELD MELTING FURNACES

FREQUENTLY REDUCE PRODUCTION COSTS BY MORE THAN HALF! Burning the cheapest known fuels, gas or oil, interchangeably, Hausfeld Crucible and Non-crucible Furnaces develop amazingly high temperatures, uniformly maintained and at a small fraction of the cost of more complicated equipment. The saving in operating costs more than pays for discarding less efficient furnaces. Write today for book containing comparative cost records taken from typical foundries.

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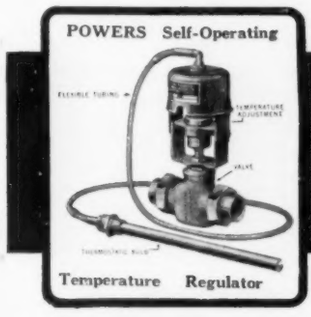

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Only a few of our many different types of controls are shown here. Write for bulletin.

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★ TEMPERATURE AND HUMIDITY CONTROL ★

W. Virginia and Kentucky. *John Liskow* has been appointed Chief Engineer, and *Carl Noderer*, one of the original employees of the Co., becomes Experimental Engineer. The Schneible Co. manufactures the Multi-Wash dust collector.

The *J. J. Siefen Co.*, 1936 W. Lafayette Boulevard, Detroit, Mich., announces the appointment of R. H. Alden as sales manager, effective Dec. 1, 1937. *E. H. Mead* and *L. I. Schreck* have also joined the company.

Nickel in Home Modernization

Home economists of 26 branches of the New Jersey Public Service were guests at a special luncheon, held November 5th at Essex House, 160 Central Park South, New York by the *International Nickel Company*, 67 Wall St., N. Y., and *Whitehead Metal Products Co. Inc.*, 304 Hudson St., N. Y.

Frank A. Sansom of the Household Division of the International Nickel Co., spoke on the qualities of Monel and various new developments in kitchen equipment. *Sterling M. Lefler*, of the Household Division of the Whitehead Metal Products Co. Inc., spoke on home modernization. A moving picture film entitled, "Here, There and Everywhere" made by the International Nickel Company, and a film entitled, "It Can Happen Here," made by the *National Kitchen Modernizing Bureau*, were shown following the talks.

The luncheon was followed by a tour of modern kitchens in New York including Hampshire House, 150 Central Park South where 232 Monel sinks have recently been installed and the modernistic kitchens at Good Housekeeping Magazine and General Foods.

Metals at the Golden Gate International Exposition

Metals will be one of the features to be held in San Francisco, Calif., 1939. Tentative plans for "Inspiration City," the community of representative homes of all ages of civilization include a Pompeian house showing the crude examples of lead pipe plumbing in those days; a medieval castle showing the gold and silver work in the decorative scheme of that day; the last word in ultra-modernistic homes showing the widespread use of metals and metal finishes throughout the home.

Course in Technical Writing

An extension course in technical writing is offered at the University of Wisconsin, Madison, Wisc., in order to aid technical men in obtaining a proper mastery of the English language in writing for publication clearly and effectively. The Extension Division offers a home study course in composition of technical papers, available to individuals anywhere. It is recommended especially for active technicians who desire to increase their proficiency in writing business letters, reports and articles for publication. For information communicate with the University Extension Division, University of Wisconsin, Madison, Wisc.

Metal Working with Oxy-Acetylene

"*Modern Metalworking with the Oxy-Acetylene Flame*," a new two-reel silent motion picture film that depicts the construction and operation of the oxy-acetylene torch and the oxy-acetylene process for joining and severing metals is the latest addition to the film library of the Bureau of Mines, Department of the Interior.

Copies of this film 16-mm and 35-mm size may be had for exhibition, free, except for transportation charges. Apply to Bureau of Mines Experiment Station, 4800 Forbes St., Pittsburgh, Pa.

THIS handy accurate tool and a copy of the new Smooth-On Handbook will come to you by return mail and absolutely free if your request is mailed within 60 days from the appearance of this offer.

SMOOTH-ON should be used for the following and similar purposes:—Repairs to boilers, engine cylinders, pumps, elevator cylinders, condensers, cracked pipes, feed-water heaters, economizers, steam and oil separators, storage tanks, valves, etc.—pressure-tightness at new and old screw-threaded and flanged joints, porous spots or cracks in pressure containers. — emergency joints without threading, etc.

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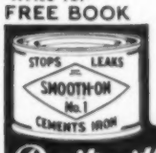

Judicious use of Smooth-On as instructed in the Smooth-On Handbook is saving thousands of dollars for plant owners, and untold hours of hard, dirty, overtime work for the operating men. You overlook an opportunity if you do not avail yourself of its benefits.

Get Smooth-On in 1 or 5-lb. can or larger steel pail from your dealer or if necessary from us direct.

Do it with SMOOTH-ON

SMOOTH-ON MFG. CO., Dept. 18
574 Communipaw Ave., Jersey City, N. J.

Please send the free Protractor and the Smooth-On Book.

Name .....

Address .....

12-37 .....

Metal Products Corporation Earnings

NET PROFIT UNLESS FOLLOWED BY (L) WHICH IS LOSS

	1937	1936
Anaconda Copper Mining Co. (9 mos.)	$26,965,164	$9,940,132
Bohn Aluminum & Brass Corp. (3rd quarter)	309,778	307,693
Bridgeport Brass Co. (9 mos.)	391,151	658,806
Cleveland Graphite Bronze Co. (3rd quarter)	401,028	253,122
Grand Rapids Brass Co. (year to Aug. 31)	31,113	77,424 (L)
International Silver Co. (3rd mos.)	38,944,380	27,029,078
International Silver Co. (3rd quarter)	167,897	114,972
New Jersey Zinc Co. (9 mos.)	6,523,928	3,593,585
New Jersey Zinc Co. (3rd quarter)	2,172,145	1,253,813
Reynolds Metal Co. (9 mos.)	1,705,028	1,557,773
Reynolds Metal Co. (3rd quarter)	581,392	639,564
Rome Cable Corp. (3rd quarter)	32,806	14,910 (L)
Sterling Aluminum Products (10 mos. to Oct. 31)	346,555	342,096
Vulcan Detinning Co. (3rd quarter)	50,062	77,679

Metal Market Review

November 19, 1937.

Copper continued its course of the past two months—downward. The last report in these columns showed that on October 26th all producers lowered their quotations to 12c per pound, electrolytic, delivered Connecticut Valley. This price held for about two weeks of very small sales and then a custom smelter reduced its price from 11¾c to 11½c, and on November 5th, to 11c, but still obtained very little business. The producers in the meantime maintained their nominal 12c quotation.

Sales for the month of October amounted to only 23,238 tons compared with 28,936 tons in September. Sales for the last four weeks were 4,760; 7,271; 3,418 and 7,503 tons, making a total of 22,952 tons compared with 25,144 tons in the preceding four-week period.

Domestic stocks of refined copper increased 37,521 in October and blister stocks decreased 6,013 tons making the net increase 31,508 tons. Foreign refined copper stocks increased only 65 tons and blister stocks increased 6,651 tons. Copper production abroad is being adjusted to the requirements of the market and it is expected that foreign stocks will be kept at a safe level.

Prospects are indeterminate.

LATE FLASH: On Nov. 23 copper was reduced to 11c and later to 10.75.

Zinc held a steady, if slow course. The last price shown in these columns was 5.75c per pound, Prime Western; E. St. Louis, set on October 25th, still holds. Sales were very restricted during the last four weeks although a fair tonnage of previously reported metal was larger. Imports of slab zinc into the United States for September totalled 14,741 tons compared with 3,960 tons in August.

Unfilled orders at the end of October were 75,806 tons compared with 92,319 tons at the end of September. Stocks rose from 13,517 to 25,817 tons.

Prospects, highly speculative.

LATE FLASH: On Nov. 22 zinc was reduced to 5.50.

Lead was member of the "toboggan club." Last quoted here at 5.35c per pound E. St. Louis, it was reduced on November 3rd to 5.10 and on November 4th to 4.85 in spite of an excellent statistical showing for September; the market feared that October statistics would show a reversal of this trend. Sales, week by week, were 7,901; 1,515; 1,936 and 8,675 tons making a total of 20,027. The last week was much more cheerful in tone occurring at the time when business sentiment improved. The above total compares with 10,066 tons in previous four-week period.

Prospects, cloudy.

Tin was another sufferer from the destructive forces. Quoted at 47.75c per pound Straits in these columns on October 27th, it dipped to a low of 42.25 November 8, bounced back to 45.50 on Nov. 12th and settled to 42.875 on November 17. The causes of the decline were at least twofold. The American tinplate industry is now down to about 60%. In addition Malayan opposition to a reduction of output from 110% to 85% by the International Tin Committee on the ground that "standard tonnages need revision," causing much confusion. Needless to state, sales were comparatively low throughout, except for the few days, November 9-15 when prices were rising.

Prospects, also highly speculative.

Platinum put in another dull month receding to $40-42 per ounce Troy.

Scrap Metals had the same troublesome time as primary materials. Copper scrap teetered, became easier, dropped sharply and then rose slightly during the past four weeks. At this time, however, offerings, are poor indicating that owners of scrap have a little more confidence that they are close to "rock bottom." Aluminum dropped sharply and then remained dull and slow. Brass and aluminum ingot demand was very poor and deliveries made heavy inroads into unfilled orders, which, on November 1st on the books of the members of the Non-Ferrous Ingot Metal Institute amounted to 15,557 tons compared with 18,641 tons on October 1st. The combined deliveries of brass and bronze ingots and billets by the members for the month of October amounted to 5,430 tons compared with 6,683 tons in September.

The Institute reports the average prices per pound received by its members on commercial grades of 6 principal mixtures of ingot brass during the 28-day period ending October 29th, as follows:

	4 wks. end. Oct. 29	4 wks. end. Oct. 1
80-10-10 (1½ Imp.)	14.732	15.543
78% Metal	11.719	11.833
81% Metal	12.170	11.813
83% Metal	12.142	13.014
85% Metal	12.743	13.249
No. 1 Yellow Brass	10.004	10.575

Average Prices for Metals

	Oct.
COPPER c/lb. Duty 4c/lb.	
LAKE (del. Conn. Producers' Prices)	12.862
ELECTROLYTIC (del. Conn. Producers' Prices)	12.060
CASTING (f.o.b. ref.)	11.674
ZINC (f.o.b. E. St. Louis) c/lb. Duty 1¾ c/lb.	
Prime Western (for Brass Special add 0.05-0.10)	6.087
TIN (f.o.b. N. Y.) c/lb. Duty Free, Straits	51.456
LEAD (f.o.b. St. L.) c/lb. Duty 2½ c/lb.	5.561
ALUMINUM c/lb. Duty 4 c/lb.	20.000
NICKEL c/lb. Duty 3 c/lb. Electrolytic 99.9%	35.000
ANTIMONY (Amer.) c/lb. Duty 2 c/lb.	16.925
SILVER c/oz. Troy, Duty Free	44.75
PLATINUM $/oz. Troy, Duty Free	45.287
GOLD—Official U. S. Treasury Price $/oz. Troy	35.000

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CLEANING COMPOUNDS are widely used in the METAL FABRICATING FIELD

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Today, many large manufacturers in leading industries use Western metals exclusively. They have found that Western metals stamp out waste and save them thousands of dollars annually. Western engineers and craftsmen work with tools, gauges and machines as precise as those of a watchmaker. Western customers get the benefit of this fine workmanship which has built up a reputation for precision that just didn't happen over night. That's why it will pay you to standardize on Western metals.

Western BRASS PRODUCTS Western Cartridge Company East Alton Illinois

WESTERN CARTRIDGE COMPANY, EAST ALTON, ILLINOIS

BRASS : BRONZE : PHOSPHOR BRONZE : NICKEL SILVER

Supply Prices, November 24, 1937

Anodes

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 2,000 lbs. or more, and subject to changes due to fluctuating metal markets.

COPPER: Cast ..... 20⅝c. per lb.
Electrolytic, full size, 15⅝c. cut to size ..... 15⅝c. per lb.
Rolled oval, straight, 16⅛c.; curved ..... 17⅛c. per lb.
BRASS: Cast ..... 19⅜c. per lb.
ZINC: Cast ..... 12⅜c. per lb.

NICKEL: 90-92% ..... .45 per lb.
95-97% ..... .46 per lb.
99%+cast, 47c.; rolled, depolarized, 48.
SILVER: Rolled silver anodes .999 fine were quoted Nov. 24, from 48c. per Troy ounce upward, depending on quantity.

White Spanish Felt Polishing Wheels

Diameter	Thickness Under ½"	½-15/16"	1-2"	2-3½"	Over 3½"
Under 1"	6.35-6.40	6.20-6.25	6.10-6.15	6.10-6.15	6.35-6.40
1" to 1 7/16"	5.85	5.70	5.60	5.60	5.85
1½" to 3 15/16"	5.55	5.35-5.40	5.30-5.35	5.30-5.35	5.60
4-5 15/16"	4.95-5.00	4.70-4.85	4.65-4.75	4.65-4.75	4.95-5.00
6", 8" & 9"	3.80-4.25	3.45-3.95	2.45-3.05	2.45-3.00	2.90-3.35
10" to 18"	3.80-4.25	3.45-3.95	2.45-2.95	2.45-2.85	2.90-3.25
Over 18"	3.80-4.25	3.45-3.95	2.70-3.05	2.70-3.00	2.90-3.35

Prices above are for less than 50 lb. For 50 to 99 lb. deduct from 30c per lb. to 5% from list; for 100 lb. and over deduct from 50c per lb. to 10%.

ODD DIAMETERS: (7" & 11" to 17"). Less than 50 lb. add 40c per lb. to above "Even Diameters" list. 50 lb. or over—all one size and consistency and in one shipment—same as "Even Diameters" list above.

On grey Mexican wheels deduct 10c per lb. from above prices.

Cotton Buffs

Full disc open buffs, per 100 sections when purchased in lots of 100 or less are quoted:

16" 20 ply 84/92 Unbleached	$75.24
14" 20 ply 84/92 Unbleached	57.67
12" 20 ply 84/92 Unbleached	43.28
16" 20 ply 80/92 Unbleached	63.28
14" 20 ply 80/92 Unbleached	48.57
12" 20 ply 80/92 Unbleached	36.52
16" 20 ply 64/68 Unbleached	59.69
14" 20 ply 64/68 Unbleached	45.84
12" 20 ply 64/68 Unbleached	34.49

⅜" Sewed Buffs, per lb., bleached or unbleached 54c to 90c

Chemicals

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P. l.c.l. Drums	lb.	.06¼
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.05¼-.05¾
Chromic, 100 lb. drums		.16¼-.16¾
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.027
Hydrochloric, C. P., 20 deg., carboys	lb.	.08
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07½
Sulphuric, 66 deg., carboys	lb.	.02½
Alcohol—Butyl, drums (f.o.b. destination)	lb.	.10-.10½
Denatured, carloads (f.o.b. prod. pts.)	gal.	.35-.40
Alum—Lump, barrels	lb.	.0340-.0365
Powdered, barrels	lb.	.0355-.0380
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05¼
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.55-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.0255-.0305
Cadmium oxide, 50 to 1,000 lbs.	lb.	1.60
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05¾-.06
Chrome, Green, commercial, bbls.	lb.	.21
Chromic Sulphate, drums	lb.	.26¼
*Copper—Acetate (Verdigris)	lb.	.25
Carbonate, 53/55% cu., bbls.	lb.	.15¾-.16¾
Cyanide (100 lb. kgs.)	lb.	.37
Sulphate, tech., crystals, bbls.	lb.	.052
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour (Turkish)	lb.	.07
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
*Gold Cyanide, Potassium 41%		$15.45
*Gold Cyanide, Sodium 46%		$17.10
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.016
Lead—Acetate (Sugar of Lead), bbls.	lb.	.12-.14¾
Oxide (Litharge), bbls.	lb.	.12½
Lime Compositions for Nickel	lb.	.09½-.11
Lime Compositions for Brass	lb.	.09½-.11
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) Pure, drums l.c.l.	gal.	.40½
Nickel—Carbonate, dry bbls.	lb.	.36-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 lb. bbls.	lb.	.13½-.14½
Salts, double, 425 lb. bbls.	lb.	.13½-.14½
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07¼-.08⅝
Potassium—Bichromate, casks (crystals)	lb.	.09¼
Carbonate, 98-100%	lb.	.06¾
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.03
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.38
Cyanide, 100 oz. lots	oz.	.44
Nitrate, 100 ounce lots	oz.	.32¾
Soda Ash, 58%, bbls.	lb.	.0235
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.17½-.22
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	2.75-3.15
Nitrate, tech., bbls.	lb.	.0325
Phosphate, tribasic, tech., bbls.	lb.	.03
Silicate (Water Glass), bbls.	lb.	.01½
*Stannate, drums	lb.	.28-.31
Sulphocyanide, drums	lb.	.30-.35
Sulphur (Brimstone), bbls.	lb.	.02¾
*Tin Chloride, 100 lb. kegs	lb.	.34½
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
White Silica Compositions for Brass	lb.	.07½-.10
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.13
Cyanide (100 lb. kegs)	lb.	.36
Chloride, drums, bbls.	lb.	.08
Sulphate, bbls.	lb.	.0405

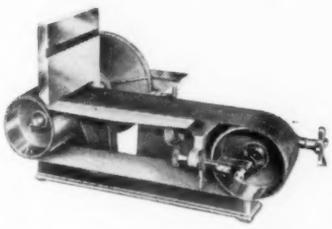
* **Subject to fluctuations in metal prices.**

Metal Prices on page 652.

SPECIALISTS CAN get results when they devote years to a single type of work! These two Walker-Turner tools offer proof that our years of intensive research, engineering and production studies in small power tools alone have resulted in unusual value at the price.

A LITTLE MONEY BUYS
A BIG SURFACER!

FOR TOUCH-UP AND FINISHING



"SERIES 700"
BELT-AND-DISC
SURFACER
$29.95

(plus motor and accessories)

Here is a machine that should be at the elbow of any man in your plant who has touch-up work and finishing to do. Eliminates all the time-wasting drudgery; handles metal, wood, plastics, etc., quickly and accurately. Does conventional sanding on top of belt, small work on the 10" aluminous oxide disc, and large panels up to 13" wide by "stroke" surfacing under the belt. 4" wide aluminous oxide belt operates on two balanced 5" pulleys, with adjustable tension. Sealed ball bearings. Precision-built, to close tolerances throughout.

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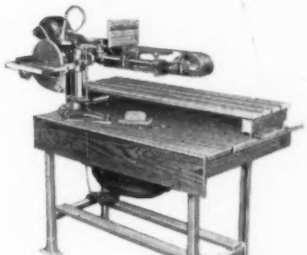


"SERIES 900"
BELT-AND-DISC
SURFACER
$138.75

complete as shown, including bench, dust-collecting unit and rolling table, motor (½ h.p. 60 cy. A.C.) and lamp.

At this low price, Walker-Turner offers you a surfacer of sufficient ruggedness and capacity to handle any job. All three methods of surfacing; on all materials including large areas and panels up to 30" wide, any length. 4 dust-sealed bearings, complete dust-collecting system, carefully balanced disc and pulleys. If finishing of wood, metal, cork, plastics or other materials is an important part of your production, see this machine.

YOUR NEARBY Walker-Turner dealer will supply these machines promptly. Descriptive bulletin sent on request. Walker-Turner Co., Inc., 34127 Berckman St., Plainfield, N. J.

WALKER-TURNER
***Engineered* POWER TOOLS**

Besplate
NICKEL ANODES

ARE QUALITY PRODUCTS . . .

LEADERS in the Nickel Plating Industry have standardized on McGean Besplate 99% Nickel Anodes — Because

1. Cathode Deposits are smoother
2. Anode corrosion is excellent
3. Less frequent filtering of solution required

◆◆◆◆◆

We Also Offer
Genuine Rolled Oval
Depolarized Nickel Anodes

◆◆◆◆◆

From our complete line of Anodes and Plating Chemicals we call your attention to the following.

ANODES

Nickel (all percentages)	Tin
Copper	Brass
Cadmium	Zinc

CHEMICALS

Nickel Salts	Copper Sulphate
Nickel Chloride	Copper Cyanide
Nickel Carbonate	Copper Carbonate
Chromic Acid	Cadmium Oxide

Manufactured by

THE McGEAN CHEMICAL COMPANY
CLEVELAND, OHIO

McGEAN CHEMICALS

Metal Prices, November 24, 1937

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

New Metals

COPPER: Lake, 11.00, Electrolytic, 10.75, Casting, 10.275.
ZINC: Prime Western, 5.50. Brass Special, 5.85.
TIN: Straits 41.75. LEAD: 4.85.
ALUMINUM: 20. ANTIMONY, Ch. 15.
NICKEL: Shot, 36. Elec., 35.
QUICKSILVER: Flasks, 75 lbs., $85.00. BISMUTH, $1.00.
CADMIUM, $1.60 (nom.). SILVER, Troy oz., official price, N. Y., Nov. 24, 44¾c. GOLD: Oz. Troy, Official U. S. Treasury price $35.00.
SCRAP GOLD, 6¾c. per pennyweight per karat, dealers' quotation.
PLATINUM, oz. Troy $40-42.

Duties: Copper, 4c. lb.; zinc, 1¾c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

Ingot Metals and Alloys

	Cents lb.	Duty	U. S. Import Tax*
No. 1 Yellow Brass	9.25	None	4c. lb.[1]
85-5-5-5	11.25	None	4c. lb.[1]
88-10-2	14.75	None	4c. lb.[1]
80-10-10	13.00	None	4c. lb.[1]
Manganese Bronze (60,000 t. s. min.)	11.25	None	4c. lb.[1]
Aluminum Bronze	15.50	None	4c. lb.[1]
Monel Metal Shot or Block	28	25% a. v.	None
Nickel Silver (12% Ni)	13.25	20% a. v.	4c. lb.[1]
Nickel Silver (15% Ni)	15.50	20% a. v.	4c. lb.[1]
No. 12 Aluminum	16.75-19	4c. lb.	None
Manganese Copper, Grade A (30%)	24-29	25% a. v.	3c. lb.[1]
Phosphor Copper, 10%	15.50	3c. lb.	4c. lb.[1]
Phosphor Copper, 15%	16.50	3c. lb.	4c. lb.[1]
Silicon Copper, 10%	22.00	45% a. v.	4c. lb.[1]
Phosphor Tin, no guarantee	58-68	None	None
Iridium Platinum, 5% (Nominal)	$45.25	None	None
Iridium Platinum, 10% (Nominal)	$47.50	None	None

Old Metals

Dealers' buying prices, wholesale quantities:

	Cents. lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6¾ to 6⅞	Free	4c. per pound on copper content
Light copper	6 to 6¼	Free	
Heavy yellow brass	4⅜ to 4⅝	Free	
Light brass	3⅛ to 3⅜	Free	
No. 1 composition	6 to 6¼	Free	
Composition turnings	5 to 5¼	Free	
Heavy soft lead	4 to 4¼	2⅛c. lb.	None
Old zinc	2⅞ to 3	1½c. lb.	
New zinc clips	4 to 4¼	1½c. lb.	
Aluminum clips (new, soft)	13½ to 14	4c. lb.	
Scrap aluminum, cast	8½ to 9	4c. lb.	
Aluminum borings—turnings	7 to 7½	4c. lb.	
No. 1 pewter	21 to 23	Free	
Electrotype	4¼ to 4½	2⅛c. lb.*	
Nickel anodes	29 to 30	10%	
Nickel clips, new	30 to 31	10%	
Monel scrap	7½ to 13½	10% av.	

*** Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.**
[1] On copper content. [2] On total weight. "a. v." means ad valorem.

* On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since Nov. 23, 1937. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

Copper Material

	Net base per lb.	Duty*
Sheet, hot rolled	19⅛c.	2½c. lb.
Bare wire, soft, less than carloads	15⅛c.	25% a. v.
Seamless tubing	19⅞c.	7c. lb.

*** Each of the above subject to import tax of 4c. lb. in addition to duty under Revenue Act of 1932.**

Nickel Silver

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	27¼c.	10% Quality	29⅞c.
15% Quality	29⅜c.	15% Quality	34¼c.
18% Quality	30⅝c.	18% Quality	37½c.

Aluminum Sheet and Coil

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, carload lots, per lb.	33.00c.
Aluminum coils, 24 ga., base price, carload lots, per lb.	28.50c

Rolled Nickel Sheet and Rod

Net Base Prices

Cold Drawn Rods	50c.	Standard Cold Rolled Sheet	49c.
Hot Rolled Rods	45c.		

Monel Metal Sheet and Rod

Hot Rolled Rods (base)	35c.	No. 35 Sheets (base)	37c.
Cold Drawn Rods (base)	40c.	Std. Cold Rolled Sheets (base)	39c.

Silver Sheet

Rolled sterling silver (Nov. 24) 47c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

Brass and Bronze Material

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	
Sheet	17⅜c.	18¼c.	19⅛	4c. lb.	U. S. Import Tax 4c. lb. on copper content.
Wire	17⅝c.	18½c.	19⅜	20%	
Rod	13⅜c.	18½c.	19¼	4c. lb.	
Angles, channels	25⅞c.	26¾c.	27⅝	12c. lb.	
Seamless tubing	20¼c.	20¾c.	21½	8c. lb.	
Open seam tubing	25⅞c.	26¾c.	27⅝	20% a. v.	

Tobin Bronze and Muntz Metal

Net base prices per pound. (Duty 4c. lb.; import tax 4c. lb. on copper content.)	
Tobin Bronze Rod	19¼c.
Muntz or Yellow Rectangular and other sheathing	20⅝c.
Muntz or Yellow Metal Rod	16¾c.

Zinc and Lead Sheet

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots standard sizes and gauges, at mill, less 7 per cent discount	10.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' prices)	11.50	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' prices)	15.50	2c. lb.
Full Lead Sheet (base price)	8.25	2⅜c. lb.
Cut Lead Sheet (base price)	8.50	2⅜c. lb.

Block Tin, Pewter and Britannia Sheet

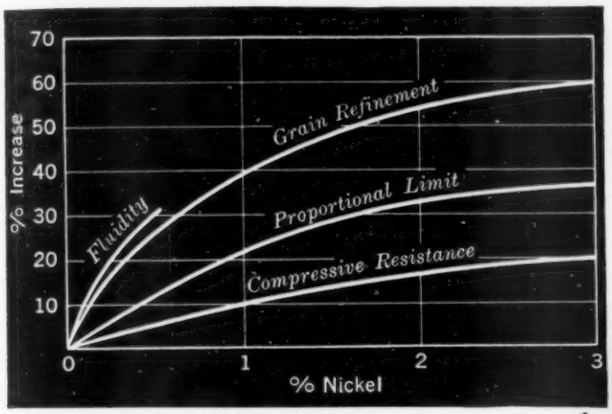
(Duty Free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

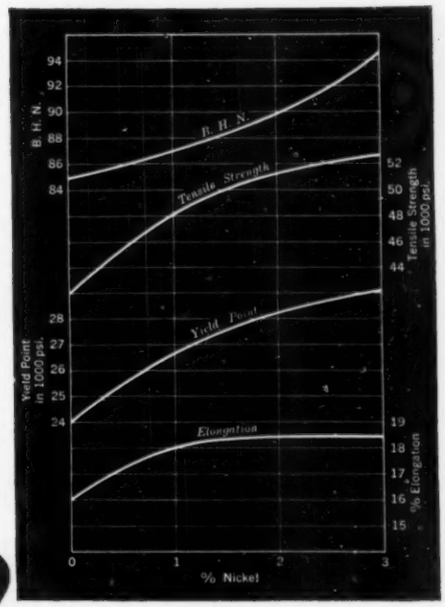
500 lbs. over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 650.

Here's ⇨ WHAT NICKEL ADDS TO BRONZE Gears



● *Charts showing effect of Nickel on the mechanical properties of a sand cast gear bronze composition: copper 88.7%, tin 11.1%, phosphorous 0.03%.*



● *Small worm gear manufactured by Hamilton Gear and Machine Co., Toronto, Ont. Hamilton adds strength and improves grain structure with the formula: copper 87.5%, tin 11.0%, Nickel 1.5%, phosphorous .1 to .2%.*

Does your gearing need greater strength, greater toughness, greater hardness? Are the increased stresses encountered in modern high speed equipment causing bronze gears to fail prematurely? You will find by adding a small percentage of Nickel to bronze gear mixtures that improved mechanical properties are economically attained and that problems of design involving higher stresses and fatigue are simplified.

The charts above show how the common 89-11 bronze is improved by adding even small amounts of Nickel. There's little we could add to the convincing story these figures tell. Except to mention that the addition of Nickel also improves the casting properties, and gives a finer grain structure, with improved fracture.

Consultation on your requirements involving the use of Nickel is invited.

Nickel Brasses and Bronzes

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

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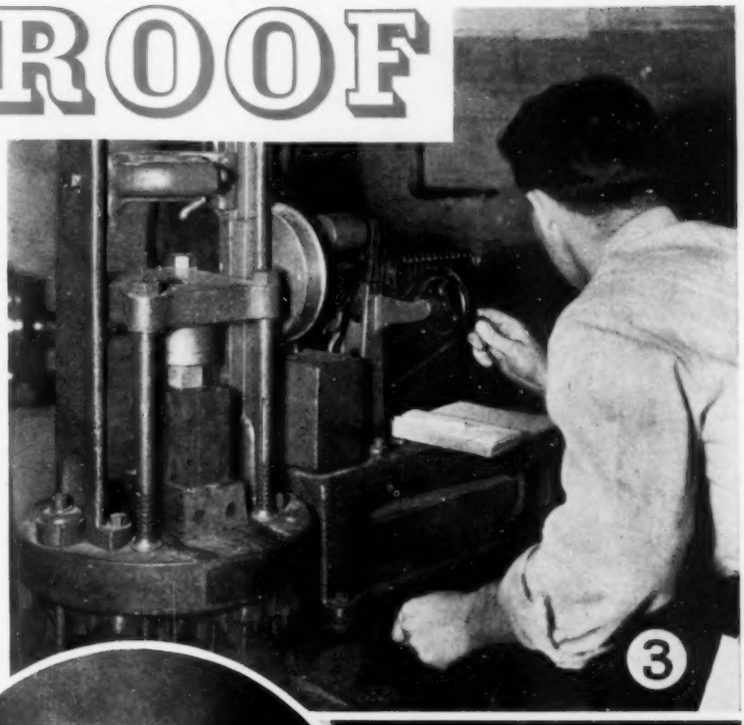
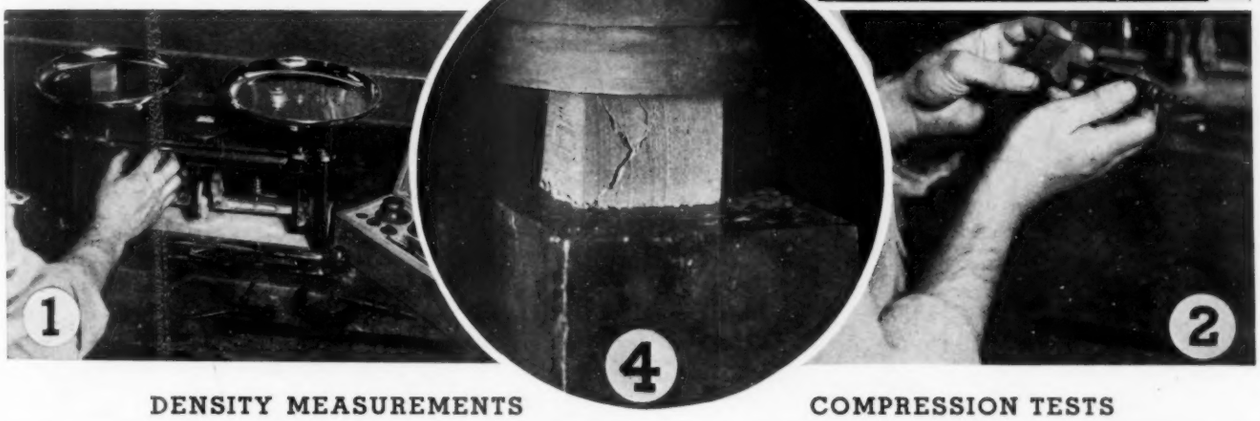
Here's PROOF

If seeing is believing—then we are sure that you will agree with us that TRI-VAC is more Dense, more Adhesive, and more Efficient.

These unretouched photographs were taken at the Detroit Testing Laboratory under the personal supervision of Mr. DeGowin, who made the density and compression tests of TRI-VAC as compared with the same tests of Tripoli.

1. A square of TRI-VAC and Tripoli were weighed for density compression. **2.** Each piece was measured with a micrometer. **3.** Engineer adjusts compression machine for testing. **4.** Close-up of the compression test of a sample of TRI-VAC.





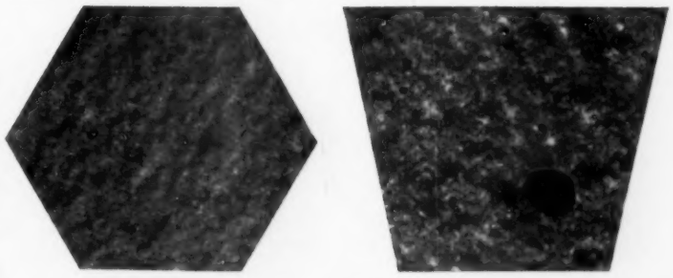
DENSITY MEASUREMENTS

MARK		DENSITY GRAMS/CU. IN.
TRIPOLI	No. 0	26.8
TRIPOLI	No. 1	27.0
TRI-VAC	No. 2	29.4
TRI-VAC	No. 3	29.5

COMPRESSION TESTS

MARK		COMPRESSIVE STRENGTH IN LBS.
TRIPOLI	No. 0	264
TRIPOLI	No. 1	255
TRI-VAC	No. 2	307
TRI-VAC	No. 3	379

Here are two photographs of fractured sections of TRI-VAC and Tripoli that have been enlarged five times to show how



they compare in structure. Note the voids and air-pockets in the Tripoli as compared with the density of structure in TRI-VAC.

All patents applied for. This advertisement was approved by the Detroit Testing Laboratory, 554 Bagley Avenue, Detroit, Michigan

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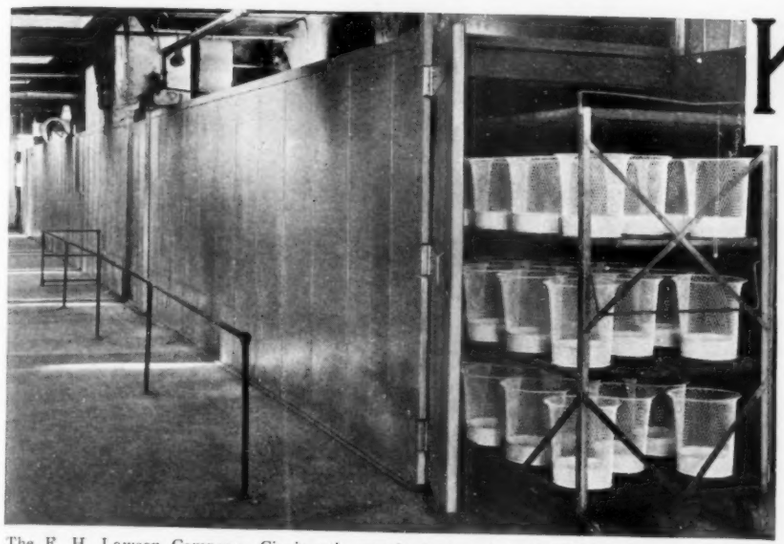

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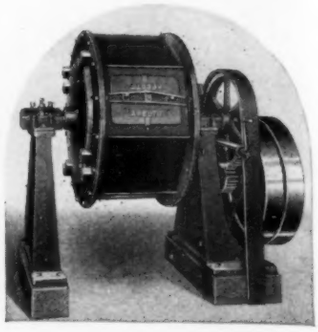

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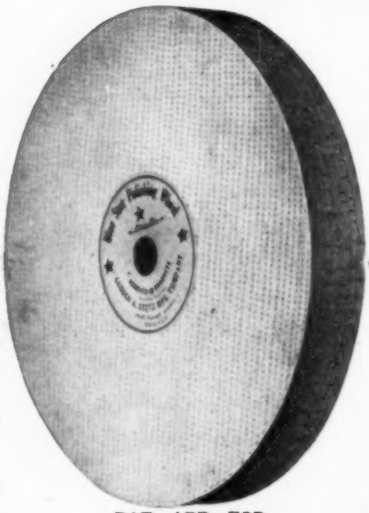
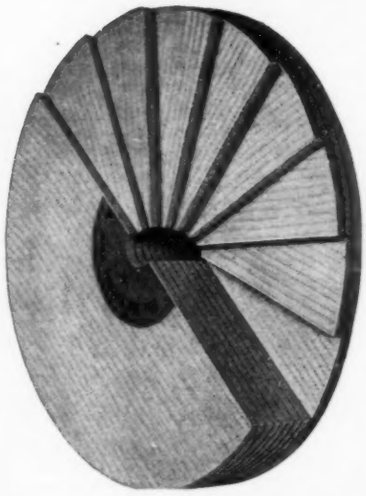


PAT. APP. FOR.

Para-Sewed Blue Star Muslin Wheels Will Not Ridge



Cross Section Para-Sewed Blue Star Muslin Wheels Will Not Ridge

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RED STAR POLISHING WHEELS
GREEN STAR POLISHING WHEELS
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Rich, transparent metallic lustre... Absolutely light-fast... Wide variety of colors and effects... Inexpensive to apply

NOW you can produce beautiful new metallic color finishes on practically any base metal . . . by a reliable, inexpensive electroplating process!

You can produce almost any color in the spectrum . . . a wide range including blues, greens, reds, mauves, golds, and other colors. Entirely new, fascinating color finishes . . . with new eye and sales appeal . . . having a deep, rich, transparent metallic sheen that defies description.

You can produce lively, sparkling colors ...soft, quiet colors... mirror, scratch brush, sand-blast, and other finishes . . . designs. By masking, you can apply several different colors to a single article.

Only a *single* electroplating bath is required for all colors! A change from one color to another is merely a matter of increasing or decreasing plating time.

The colored coatings are inorganic . . . contain no pigments or dyes. Colors are absolutely light-fast . . . will not fade.

Investigate the entirely new field of opportunity opened up by this revolutionary color plating process . . . opportunities to achieve striking new color finish effects . . . to vitalize existing products in need of sales-stimulating change... to invest new products with stirring eye appeal and glamour.

The articles shown suggest but a few of the many applications for "Electrocolor" which include within their range practically all instances where the use of color on metallic articles for decorative effects or for harmony with surroundings is desirable.

UNITED CHROMIUM
INCORPORATED

Executive Offices: 51 E. 42nd St., New York
DETROIT SAN FRANCISCO WATERBURY

Electrocolor

"Electrocolor" is the name which has been registered by United Chromium, Incorporated, at the U. S. Patent Office as a trade mark covering articles which are finished by its new process for producing colors on metallic articles.

A CHROMIUM PLATING SURVEY

TO ELIMINATE PRODUCTION WEAK SPOTS

NOW is a good time for chromium platers to get the lay of the land. A complete shop survey at this time may reveal improper shop conditions that have crept in due to the press of business. Out-dated plating methods, inadequate equipment, or a poorly arranged production line... any one of which might result in costly, inefficient operation. ¶ United Chromium welcomes an opportunity to make such a check-up in your plant. Under the U. C. Licensing Arrangement, a large and increasing number of manufacturers and job platers have availed themselves of this engineering service.

United Chromium, Incorporated, Executive Offices: 51 East 42nd Street, New York. Detroit, San Francisco, Waterbury.

UNITED CHROMIUM

INCORPORATED

Insoluble Smuts REMOVED *without wiping* by SATUROL PROCESS

PROCESS PATENTED U. S. PAT. NO. 2,032,174

ASK US ABOUT

Cleaning Before Plating, Tinning

Cleaning aluminum and aluminum alloys

Cleaning Cast-iron Parts

Would you like to get rid of a lot of the brushing, do away with a lot of the rag-wiping, and long hours of hand work that the removal of insoluble smut, buffing and polishing compositions usually call for to prepare surfaces for plating?

Then use the OAKITE SATUROL PROCESS . . . . an ORIGINAL development, the result of long study by our Technical Research Division and on which an EXCLUSIVE PATENT has been granted by the U. S. PATENT OFFICE.

Many Advantages For You!

This unique, time-saving process is safe . . . it enables you to handle work in bulk, on a real production basis . . . it saves time . . . it saves you money! Let us make tests in your plant . . . or write today for details. No obligation.

●

Manufactured only by

OAKITE PRODUCTS, INC., 18 Thames St., New York, N. Y.

Branch Offices and Representatives in all Principal Cities of the U. S.

OAKITE

TRADE MARK REG. U.S. PAT. OFF.

SPECIALIZED INDUSTRIAL CLEANING MATERIALS & METHODS

General Ceramics Chemical Stoneware

Adaptable!

Both standard and special types of pickling and plating tanks are available for metal cleaning and finishing purposes.

Durable!

General Ceramics Chemicalware is impervious to all chemicals used in the metal industries . . . leakproof even when its outer glaze is accidentally chipped.

Clean!

General Ceramics Chemical Stoneware cannot cause contamination or spoilage and is easy to keep clean.

Economical!

Good electrical insulation assures low current costs. Rugged, corrosion-proof construction provides long life and economy.

Complete information on General Ceramics Chemical Stoneware will be sent without cost or obligation.

GENERAL CERAMICS COMPANY
CHEMICAL STONEWARE

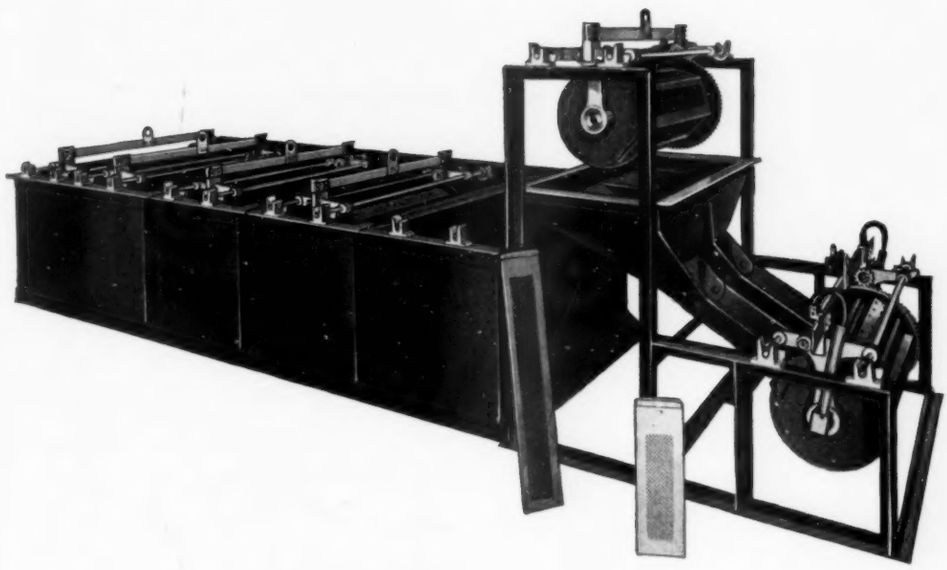
GENERAL CERAMICS COMPANY

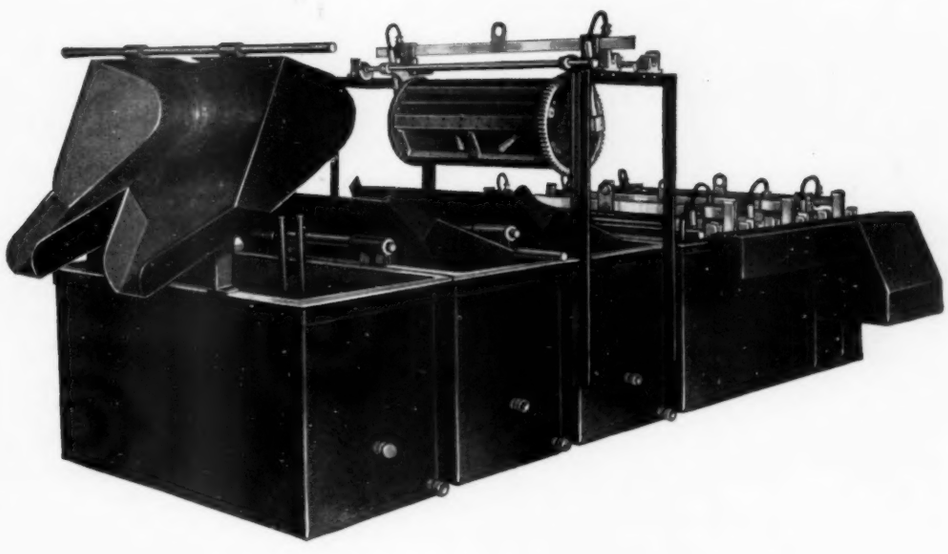
30 ROCKEFELLER PLAZA NEW YORK, N. Y.

Buffalo: 306 Jackson Building
Chicago: 208 South LaSalle St.
Los Angeles: 315 South Central Ave.
Tacoma: Tacoma Building
San Francisco: 270 Monadnock Bldg.
Montreal: 1009 University Tower

LASALCO PRESENTS

MULTIPLE CYLINDER CLEANING-PLATING-RINSING
MACHINES WITH SIMPLE STURDY HOPPER CHUTES





LASALCO Inc., 2822-38 LaSalle Street, St. Louis, Mo.

MANUFACTURERS OF SPEED PLATING EQUIPMENT

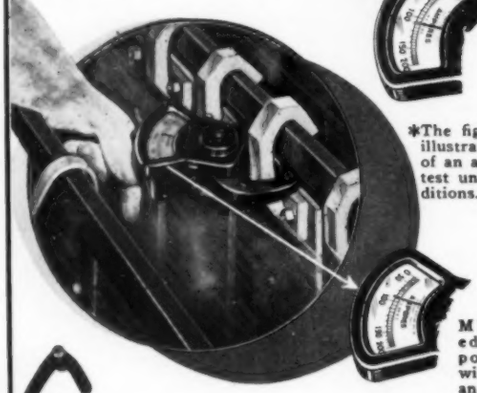
"MILLER"
CHROMIUM ANODES

CARRY MORE CURRENT
... Proved by Actual Plating by the Tong Test*

MILLER 3" corrugated anode carries 108 amperes. Old style 6" anode carries 92 amperes.

No. 2

*The figures used in this illustration are the result of an actual plating room test under duplicate conditions.



MILLER knife-edge hook insures positive contact with anode rod . . . and one-piece construction insures positive connection from hook to anode.

No. 1

No. 5

No. 3

No. 6

No. 4

HOOK SPECIFICATIONS

Standard Hook Number	Maximum Anode Rod Size	Distance from Top of Rod to Solution
1	1½" diameter	5"
2	1" x 2" rectangular	5"
3	1¼"-2" diameter	5"
4	1" x 2½" rectangular	5¾"
5	1½" diameter	3½"
6	2" diameter	7" and over
7	1" x 2½" rectangular	7" and over

TERMS: 1%, Net 30 days. F.O.B. Grand Rapids, Mich.
Prices subject to change without notice.
Send us your Mail Orders. Prompt deliveries made to all parts of U. S. and Canada.

PRICES
April 6, 1937

12"	$1.50	28"	$2.30
14"	1.60	30"	2.40
16"	1.70	32"	2.50
18"	1.80	36"	2.65
20"	1.90	40"	2.80
22"	2.00	44"	3.05
24"	2.10	48"	3.20

Tin lead furnished at 25% additional.
Note: No. 6 and No. 7 Hooks furnished at 25c per anode extra.

GRAND RAPIDS MAIN OFFICE TELEPHONE 9-0155
TOLEDO OFFICE TELEPHONE FOREST 1981
DETROIT OFFICE TRINITY 28000

J. C. MILLER COMPANY
Manufacturers of Electroplating and Polishing Equipment and Supplies
55 MT. VERNON AVE., N. W., - - - GRAND RAPIDS, MICHIGAN

Merry Christmas
Happy New Year

What a happy arrangement, to have Christmas just before New Year's Day! Christmas is the time to "square accounts" for the year so nearly gone. Disappointments and discouragements are swept away by the flood tide of Good Cheer at Christmas. It brings new Hope and Confidence for the New Year.

This festival of Good-Will gives us occasion to express gratitude for countless friendships, and for the many opportunities given us to serve. May the New Year bring Peace, Happiness and Abundance to All!

The J. B. Ford Company
WYANDOTTE, MICHIGAN

Wyandotte PRODUCTS

ANNOUNCING Stevens NEW NICKEL BUFFING COMPOSITIONS

No. 601 HI-LUSTER (White)
Extra Dry. For finest finish on such work as small die-cast parts and for final wiping operations.

No. 602 HI-LUSTER (Pink)
Medium Dry. Contains a percentage of the finest quality rouge.

No. 650 FAST FINISH (White)
Medium Dry. Fast Cutting. Especially valuable for buffing operations on hard, dense deposits. Also for coloring copper, brass, etc.

THE SENSATIONAL PERFORMANCE of these new products is due to a new formula, a new method of manufacturing, discovered and developed by our research laboratory.

Thoroughly tested, each comparison has piled up the proof that these newest lime compositions outclass all others. Here's what they will do for you:

Produce a clearer, more lustrous, more beautiful pre-chrome finish on your nickel plated work; bring up that finish quicker, easier, and do it more economically. They will clean perfectly before chrome plating.

Their uniformity is guaranteed by strict control in the laboratory and in the manufacturing process.

It's easy to prove the above statements. Give your buffers a cake of one of these new compositions. Let them use it —then "Ask the Man at the Wheel".

Samples on request. Specify which you desire or tell us about the type of work you are doing.

FREDERIC B. STEVENS, INC.
DETROIT, MICH.

EVERYTHING FOR A POLISHING AND PLATING PLANT

New Haven Indianapolis Buffalo Cleveland Windsor Toronto

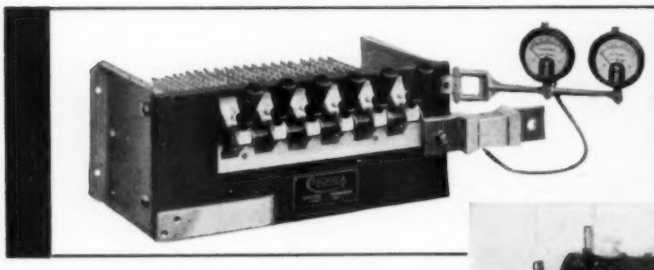
CHROMIC ACID

MUTUAL CHEMICAL CO. OF AMERICA
MUTUAL
NEW YORK, N.Y.

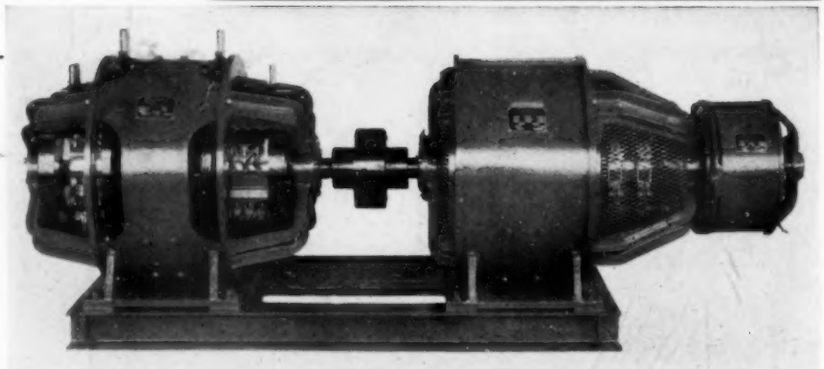
Mutual is the world's largest manufacturer of chromium chemicals and the only firm owning and operating their own chromite mines. We were one of the first producers of chromic acid in this country and through product improvement, did much to stimulate its use and make possible the present volume of consumption.

MUTUAL CHEMICAL COMPANY

Mutual Chemical Company of America - - - 270 Madison Avenue - - - New York City



Two Answers to Your Plating Problems



Dependable plating equipment is as important in producing a good plating job as is a high quality plating solution.

Columbia Electroplating Generators and Plating Tank Rheostats embody every feature necessary for quality work. The generators have welded steel frames, anti-friction bearings, excellent ventilation, sparkless commutation—all of these insure greater efficiency, longer life and lower maintenance costs.

Columbia Plating Tank Rheostats have cast grid resistors of uniform thickness which will not sag or warp. Self-wiping, cam type, toggle switches insure clean, positive contacts, thus reducing the contact drop.

Literature on both these Columbia products will gladly be sent to you, on request.

COLUMBIA ELECTRIC MFG. CO., 4512 Hamilton Ave., CLEVELAND, OHIO

COLUMBIA LOW VOLTAGE GENERATORS and PLATING TANK RHEOSTATS

ALLIED
BUFFS AND POLISHING WHEELS

If you are interested
in the "KOST KUTTER"
write for detailed information.

May we have the pleasure of submitting samples and quoting on your future requirements.

KOST KUTTER BUFF

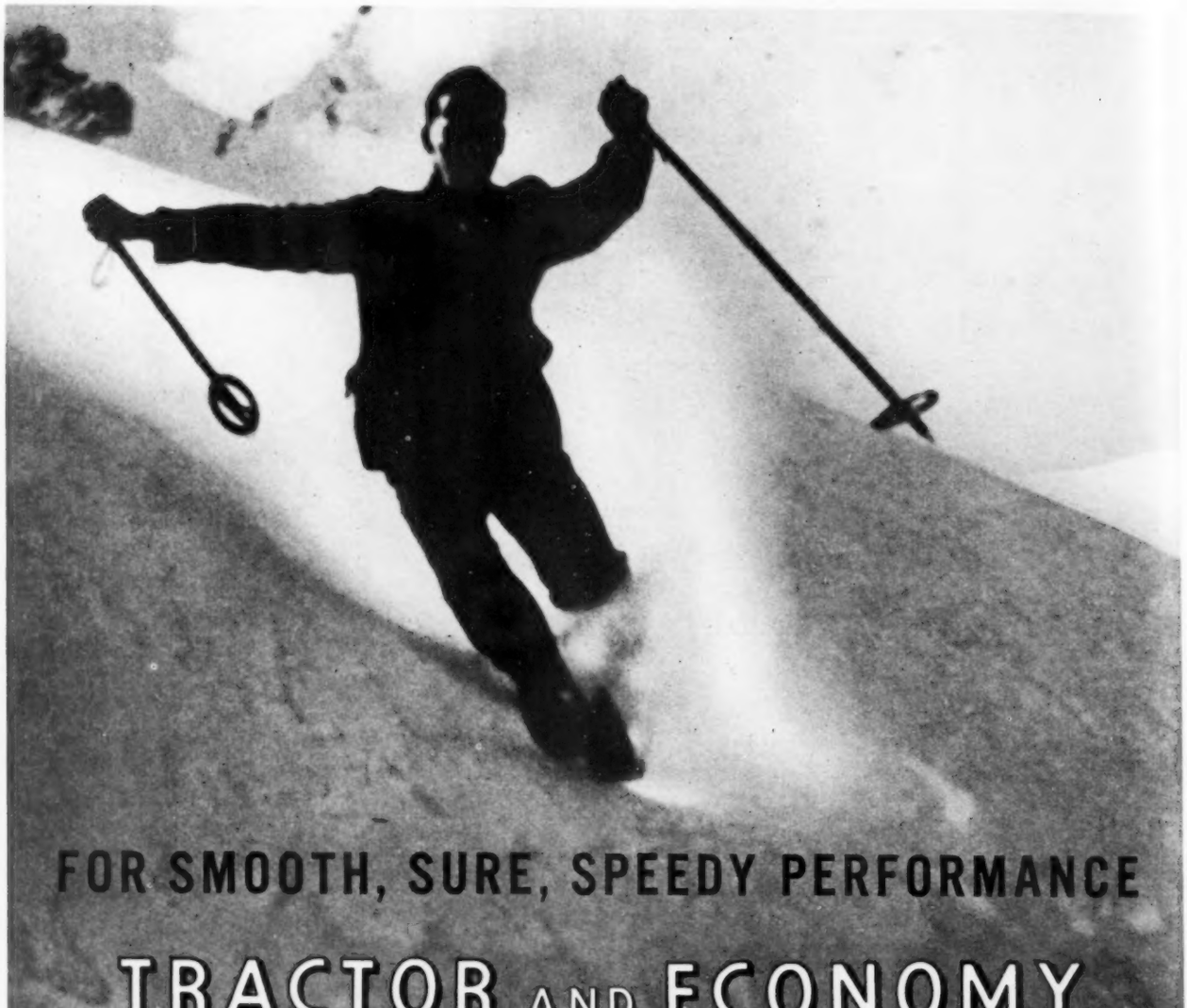
ALLIED INDUSTRIAL PRODUCTS CO.
17 N. Elizabeth St., Chicago, Ill.

YOUR GUARANTEE OF SATISFACTION

BOOST PRODUCTION
. . . . . GET UNIFORM DEPOSITS
. . . . . FEWER REJECTS
USE HARSHAW PURE ANODES AND CHEMICALS
THE HARSHAW CHEMICAL CO.

Manufacturers, Importers, Merchants
Offices and Laboratories: Cleveland, Ohio
Quality products since 1892

New York, Philadelphia, Chicago, Detroit, Pittsburgh,
Cincinnati, East Liverpool, Los Angeles, San Francisco
Works at Cleveland and Elyria, Ohio and Philadelphia, Pa.



FOR SMOOTH, SURE, SPEEDY PERFORMANCE

TRACTOR AND ECONOMY BUFFS

These buffs are *different!* They're built of cloth that has been designed solely for use in buffs. Made to serve just this one purpose, they serve it perfectly. Their remarkable resistance to wear is cutting costs in leading plants everywhere.

Manufactured exclusively by HANSON-VAN WINKLE-MUNNING CO.

PACIFIC MILLS

78 CHAUNCY STREET, BOSTON, MASS.

THERE IS NO PROFITABLE SUBSTITUTE FOR QUALITY

H-VW-M News

Prepared by HANSON-VAN WINKLE-MUNNING CO.

DECEMBER, 1937 MATAWAN, N. J. Page 1

HERE'S OUR STORY

COBALT NICKEL

COBALT-NICKEL PLATING FOR CONSISTENT RESULTS

Solution Composition*

	Per gallon
Nickel Sulphate	32.0
Nickel Chloride	6.0
Cobalt Sulphate	2.0
Boric Acid	4.0
Ammonium Sulphate	0.33
Formaldehyde	0.33
Sodium Sulphate	5.0

Operating Conditions

PH	4.3
Temperature	140° F.
Current Density	10–80
	Amperes sq. ft.
Wetting Agent	None
Anti-pitting Agent	None
Insoluble Matter	None
Activating Process	None
Agitation	Constant

PHYSICAL PROPERTIES OF COBALT-NICKEL ALLOY

COLOR— Brilliant White (No Yellowish Tinge)

DUCTILITY— Exceptional

HARDNESS— Nickel 63 Brinell; Cobalt-Nickel—18% 71 (300 kg.

*Patent No. 2026718

The formula of our Cobalt-Nickel solution HAS NOT been changed since it was offered to the plating industry.

Manufacturers of a complete line of electroplating and polishing equipment and supplies

HANSON-VAN WINKLE-MUNNING CO.

MATAWAN, NEW JERSEY

PLANTS . . . Matawan, New Jersey . . . Anderson, Indiana

SALES OFFICES . . . Chicago . Cleveland . Detroit . New Haven . New York . Philadelphia . Pittsburgh . Springfield (Mass.) . Syracuse

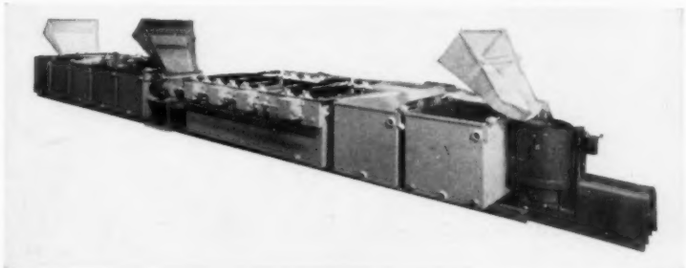
Greist Manufacturing Company Uses New Hopper-Type Plating Equipment

Tested for Over Two Years by H-VW-M

Slightly over two years ago the Hanson-Van Winkle-Munning Company designed an automatic method for handling plating barrel work through the use of simple inexpensive hopper equipment. This novel method was then put into operation at several plants for "proving ground" study before being placed before the industry for general use.

After two years of actual test under varying conditions in different plants, definite advantages have been established as follows: (1) Lower production costs; (2) Proper control of treatments; (3) Heavy production flow in smaller floor space; (4) Low maintenance up-keep, especially where monel metal or nichrome steel dipping baskets have been formerly used; (5) Improved and more effective treatment than with dipping baskets; and (6) Segregation of various classes, or small batches, of work without confusion.

One of the latest complete units of this hopper-type equipment has



recently been installed at the Greist Manufacturing Company, New Haven, Conn. The accompanying illustration gives an indication of its novel features. Work which is ball-rolled or sand-rolled is dropped into the hopper of the first tank on the left, receives a cold water rinse, and proceeds to be dropped from one hopper to another in each succeeding tank through a cleaner, cold water rinse, acid dip, a cold water rinse, then to an empty plating barrel cylinder.

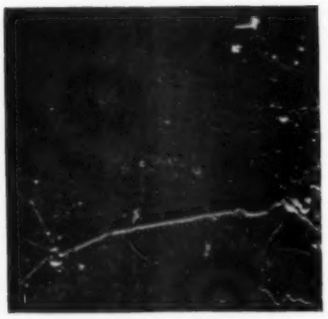
After receiving the required amount of plating time, the work then goes into the second hopper from the right (not shown because in lowered position), where it is rinsed, then dropped to the next hopper, where it is hot rinsed, and finally dropped again into the Mercil type centrifugal dryer, where all moisture is removed. From the basket of the dryer the work is again dropped into a suitable receptacle for any further production operations. Thus it is seen that with a group of simple, inexpensive tank and hopper units practically automatic operations are obtained.

On the equipment illustrated, the lifting of the hoppers for dumping is by an electric hoist, as is the handling of the plating barrel cylinders. A three cylinder plating barrel tank is shown with a spare water rinse compartment which acts as a reclaim tank and may be considered as a spare compartment for increased production when necessary. In handling the plating tank operations the hoist operator lifts the first plating barrel cylinder on the left after the hopper load is dumped into it, moves it to the next station, where it is left to get proper plating time, dumps the next cylinder, where plating has been completed, and puts this cylinder into first loading position on the left. Similarly he lifts, dumps and replaces the dryer basket after each batch is dried. For normal loads and speeds the hoist operator follows a regular routine and readily handles all loads in rotation.

Hopper-type plating operations are, of course, dependent upon the newly developed hoppers. These are of simple design, made of perforated steel or monel metal, deep enough to completely submerge loads of from seventy-five pounds up and fastened to the tank by two hinged bearings at one end. Each unit consists of a steel tank with dam type overflow, a substantial outlet, a bottom drain outlet and a hopper. Adequate rinsing is assured by proper circulation of liquid through the overflow dam, but on treatments requiring additional action a simple reciprocating device is added which will continuously swish the

(Continued on Page 2)

FOR A SUPERIOR PAINT BASE



Plain Steel Base

Jetalized Steel Base

Similarly Enameled Steels After Humidity Test—2000 hrs.

The Jetal Process is a simple, rapid, economical way to get a superior paint base on iron and steel products.

The film obtained is hard and the most adherent available. Articles Jetalized can be stored before painting—they are easily cleaned—withstand heat and electric welding, can be "blanked" and formed without harm to the coat.

Jetal is a PAINT BASE THAT STRENGTHENS EXISTING FEATURES OF LACQUERS AND ENAMELS, AND ALLOWS THEM TO DEVELOP THEIR FULL NATURAL ATTRIBUTES OF ADHERENCE.

For a Jet Black Finish

Jetal, by the same simple, low-cost dipping operation and with the same qualities as a paint base, is an excellent process for coloring iron and steel a uniform jet black. Highly polished surfaces will take a deep brilliant lustre while dull objects will take a dull finish.

Jetal applications are unlimited. Our engineers will show you how this process can save you money.

HANSON-VAN WINKLE-MUNNING CO.

MATAWAN, NEW JERSEY

PLANTS . . . . . Matawan, New Jersey . . . . . Anderson, Indiana

SALES OFFICES · Chicago · Cleveland · Detroit · New Haven
New York · Philadelphia · Pittsburgh · Springfield (Mass.) · Syracuse

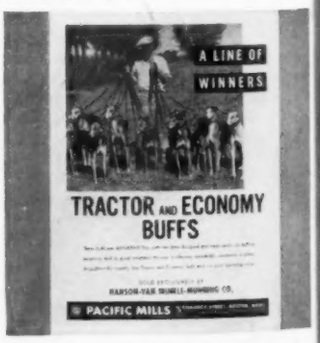
(Continued from Page 1)

hopper through a vertical stroke of about six inches. For acid solutions and subsequent rinses, the tanks are rubber lined and hoppers are monel metal.

Where loads are heavy and there is a sufficient number of loads per hour, hoist operation is less practical and automatic lifting and lowering of loads is advisable. Such automatic mechanism operates on a common shaft and properly timed to submerge the work for predetermined periods in the various tanks. Thus this equipment is readily adaptable to varying production conditions, makes for smooth progress of work in one straight line, guarantees uniform processing of all batches through the same treatments, and performs methodically for light or heavy loads at a low labor cost.

When this is compared with the orthodox dipping basket methods, the advantages are obvious. The dipping basket usually holds from twenty-five to sixty pounds of work. The articles are tightly packed in the baskets and there is no assurance that the solution is treating the entire mass uniformly. With the wide, spacious hoppers, the entire load is spread uniformly in a thin layer over the bottom of the hopper and gets the treatment solution to the work more rapidly and effectively. Some classes of work pocket the solution or contain recesses that need active tumbling. By utilizing the swishing mechanism possible with the hopper and giving it a sharp, short vertical stroke, the mass may be agitated effectively to accomplish speedy results. There is no upkeep (as repair or replacement of dipping baskets) nor is there any intricate mechanism in the hopper units.

Certain advancements in plating tank and dryer design have also been made to meet increased production conditions due to hopper operation methods. These will be described later. They form a part of the continued pioneering work in design and manufacture which has kept Hanson-Van Winkle-Munning equipment in the lead for so many years.



Pacific Mills believes in advertising their Tractor and Economy buff cloths. The buffs are made and sold exclusively by us. Write for complete details on "How Tractor and Economy Buffs Cut Operating Costs."

BUSINESS WANTS For Sale—Equipment, Etc.

FOR SALE

1—2000/1000 Ampere, 6/12 Volt, HANSON VAN WINKLE CO. Motor Generator Set, complete with full controlling apparatus, excellent condition.
1—2000 Ampere, 6 Volt, HANSON VAN WINKLE CO. (INTERPOLE-TYPE) Motor Generator Set, complete with full panelboard equipment. Excellent shape throughout.
1—1500 Ampere, 12 Volt, HANSON VAN WINKLE CO. (INTERPOLE-TYPE) Motor Generator Set, complete with controlling equipment.
1—1000 Ampere, 12 Volt, HANSON VAN WINKLE CO. (INTERPOLE-TYPE) Motor Generator Set, complete with controlling apparatus.
1—1500/750 Ampere, 6/12 Volts, EDDY ELECTRIC CO. (INTERPOLE-TYPE) Motor Generator Set, completely re-built, and with controlling apparatus.
1—1000 Ampere, 6 Volt, MUNNING-OPTIMUS—Motor Generator Set, excellent condition throughout and complete with full controlling equipment.
1—750 Ampere, 25 Volt, HANSON VAN WINKLE CO. (INTERPOLE-TYPE) Motor Generator Set, excellent shape, with full controlling apparatus.
40—BAIRD, HENDERSON, GLOBE, Tilting Type Oblique Tumbling Barrel Units, with wood, sheet steel and Brass Cylinders. Good Condition.
3—BAIRD MACHINE CO.—Double No. 1 Size Ball Burnishing Barrel Units, excellent condition throughout.
3—BAIRD-WARNER CO. Silent Oblique Tilting Type Tumbling Barrel Units, No. 2 size, complete with No. 28 steel cylinders.

MANY OTHER SIZES IN STOCK

BAIRD & ABBOTT—Burnishing and Tumbling Barrels, Polishing Lathes, Rheostats, Ammeters, Blowers, Tanks, Polishing Wheels and many other items for the Plating and Polishing Department.

WRITE FOR DETAILS

M. E. BAKER COMPANY

79-81 Haverhill St. Boston, Mass.

IMPORTANT AUCTION

TRUSTEES' SALE IN LIQUIDATION

Machinery & Equipment

Girard Smelting & Refining Co.

Milnor & Bleigh Streets, Tacony, Phila., Pa.

To be sold at PUBLIC AUCTION

Wednesday & Thursday, December 8th & 9th, 1937

At 10 A.M. on the Premises

Machinery & Equipment Blast furnaces and conveyors, white metal and copper furnaces, complete conveyor system, rotary ingot furnaces, portable jaw crusher, steel melting pots and kettles, Ingersoll-Rand air compressors, Doelger & Kuster and Canton shears, portable welding machine, hydraulic and metal baling presses, magnets, portable compressors, oil fired boiler and steam pump, ball mill and conveyor, rotary roasting furnace, locomotives, sets of pouring equipment, rotary blowers and motors, centrifugal pumps and motors, flat cars, skip buckets, pouring ladles, clam shell buckets, slag pots, wheelbarrows, hand trucks, buggies, moulds, etc.

Large Quantity of Motors

Complete Machine Shop including Cincinnati shaper, Sidney & Hendy machine lathes, drill presses, power hack saw, motors, blowers, chain hoists, small tools, etc. Weighing and beam scales.

Mack and G. M. C. Trucks, Automobiles and Complete Garage Equipment

Complete Laboratory, Large Quantity of Office Equipt.

Inspection: Tuesday, December 7th, 1937,
Between 10 A. M. and 4 P. M.
By Order of the Liquidating Trustees

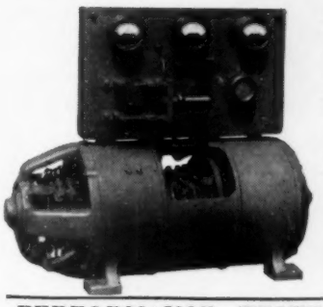
Catalogs on Request

Associated Auctioneers, Inc.

AUCTIONEERS AND APPRAISERS

1915-17-19 CHESTNUT ST., PHILA., PA.

PLATING GENERATOR BARGAINS



Specializing in the complete rebuilding of plating generators, Moreco rebuilt units are often better than the original machine when new. You can depend upon any Moreco rebuilt plater to operate to your satisfaction under load, with good commutation, no sparking and minimum brush wear. Investigate the values listed below. Priced to Sell. Fully Guaranteed.

PERFORMANCE TESTED—GUARANTEED

PLATING GENERATORS

	AMP.	VOLTS	MAKE
	100	7½	Rochester
	100	7½	Hobart motor generator set with 3 phase 60 cycle motor
	120/60	7½/15	Eager
	125	7½	Rochester
	150	6	Connecticut
	200	6	Electric Products, with direct connected AC motor drive
(3)	200	7½	Hobart with direct connected 220/440 volt 3 phase 60 cycle motor (see above illustration)
	200	7½	Acme, with 220 volt 3 phase 60 cycle direct connected motor
	250	7½	Rochester
	300	6	Chandeysson
	300/150	7½/15	Hobart with direct connected 220/440 volt 3 phase, 60 cycle motor (see above illustration)
	400/200	7½/15	Eager
	400/200	6/12	Hobart with direct connected 220/440 volt, 3 phase, 60 cycle motor (see above illustration)
(2)	400/200	6/12	Hanson-Van Winkle
	600/300	6/12	Giant
	750	12	Chromar
	1500	12	Hanson-Van Winkle
	1500/750	6/12	Chromar with 220/440 volt 3 phase, 60 cycle direct connected motor
	2000/1000	6/12	Chromar, with 220/440 volt 3 phase, 60 cycle direct connected motor.

THE MOTOR REPAIR & MFG. CO.

1555 Hamilton Ave. Cleveland, Ohio

FOR PLATING PRODUCTS SALE

1—750 Ampere, 6 Volt BOGUE ELECTRIC Motor Generator Set—completely rebuilt—with or without control panel board.

1—HANSON-VAN WINKLE 5BB Motor Driven Lathe.

1—No. 5 Double Spindle HAMMOND Belted Lathe—Extra long shaft. (New).

1—No. 4 DANIELS & ORBEN Plating Barrel—Completely rebuilt with new bakelite cylinder—With or without anodes.

PLATING PRODUCTS COMPANY

352 Mulberry St. Newark, N. J.

We Carry a Complete Stock of Plating and Polishing Supplies.

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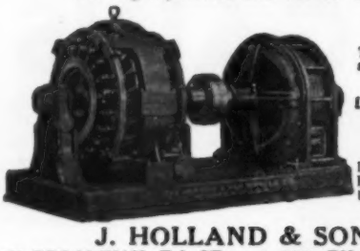

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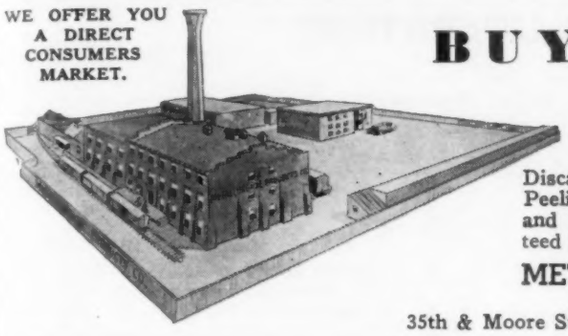

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Transite Core Plate and Pallets. Johns-Manville, 22 E. 40th St., New York City.

Zinc Alloy Die Castings in Electrical Equipment. New Jersey Zinc Co., 160 Front St., N. Y. City.

Zinc Alloy Die Castings in Business Machines. New Jersey Zinc Co., 160 Front St., New York City.

Sta-Put Lubricants. "Less Oil — Less Often." E. F. Houghton & Co., 3rd, American & Somerset Sts., Philadelphia, Pa.

Portable 7" Electric Saw. Black & Decker Mfg. Co., Towson, Md.

Arc Welding; with the 40 volt simplified arc welder. Hobart Bros. Co., Troy, Ohio.

Electric Strip Heaters. Type W. Harold E. Trent Co., 618 N. 54th St., Philadelphia, Pa.

Electric Immersion Units. Harold E. Trent Co., 618 N. 54th St., Philadelphia, Pa.

Thor Model 7 Spray Gun. Causes of spitting and pattern distortion, and how to correct them. Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill.

Tantalum Candle Heaters; for Acid solutions and other corrosive liquors. Fansteel Metallurgical Corp., North Chicago, Ill.

Explosimeter. A pocket-size indicator showing whether the gas concentration is within or above the explosive range. Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa.

How to Select the Right Motor. Century Electric Co., St. Louis, Mo.

400 *Practical Applications for Monel, Nickel and Inconel;* under corrosive conditions. International Nickel Co., 67 Wall St., New York.

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Nickel Alloy Steels for Hand Tools. International Nickel Co., 67 Wall St., New York City.

Steam Hook-Ups; for various types of heating systems; process steam applications, etc. Sarco Co. Inc., 183 Madison Ave., N. Y.

D-86 Crankpin Grinder. Norton Co., Worcester, Mass.

"*How to Increase Your Sales,*" by William Sibley. Porcelain Enamel Institute, 612 N. Michigan Ave., Chicago, Ill. A book for salesmen which includes information on the advantages and saleability of porcelain enamels.

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All-Metal Solder and Flux; for aluminum, cast iron, die cast metal, stainless steel, copper, brass, etc. Imperial Brass Mfg. Co., Chicago, Ill.

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Diamonds Used in Tools. "Industrial Diamonds." Arthur A. Crafts & Co., 532 Commonwealth Ave., Boston, Mass.

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Monel and Nickel in the Chemical Industries. International Nickel Co., 67 Wall St., New York City.

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Electric Flow Meters. Bulletin No. 494. Bristol Co., Waterbury, Conn.

Modern Potentiometer Pyrometer Recorders and Controllers. No. 493. Bristol Co., Waterbury, Conn.

Telebrineller. An instrument for checking metal hardness "on the job." Teleweld, Inc., 80 E. Jackson Blvd., Chicago, Ill.

The Dexrae Industrial X-Ray Unit; for the routine determination of metallurgical conditions in metals and alloys. Adam Hilger Ltd., 98 Kings Rd., Camden Rd., London, N.W.1., England.

Electro-Cleaning with Sodium Metasilicate, by F. J. Henning and T. K. Cleveland. Philadelphia Quartz Co., 125 S. 3rd St., Philadelphia, Pa.

Industrial Temperature Gauges. Weston Electrical Instrument Corp., Newark, N. J.

Projection Heater. Trane Co., LaCrosse, Wisc.

Multiple Projection Heater. Trane Co., LaCrosse, Wisc.

Nickel and Alloy Steels and Cast Irons in the Pulp and Paper Industry, by A. G. Zima. International Nickel Co., 67 Wall St., New York.

Nickel and Nickel-Base Alloys. Their use in the design of corrosion-resistant machinery and equipment. International Nickel Co. Inc., 67 Wall St., N. Y.

Design and Construction of Heavy Equipment in Monel, Nickel and Inconel. International Nickel Co., 67 Wall St., N. Y.

How to Select Instruments for Motor Testing. General Electric Co., Schenectady, N. Y.

Electric Furnaces for Scale-Free Hardening. Conveyor type for use with protective atmosphere. General Electric Co., Schenectady, N. Y.

Industrial Lighting Equipment. Catalog 26. Benjamin Electric Mfg. Co., Des Plaines, Ill.

Electric Melting Pots; and other electrically heated industrial equipment. Harold E. Trent Co., 618 N. 54th St., Philadelphia, Pa.

The Peril of Wage and Hour Legislation, by Allen W. Rucker and N. W. Pickering, president, Farrel-Birmingham Co. Inc., Ansonia, Conn.

Pyranol Capacitors; for power factor improvement. General Electric Co., Schenectady, N. Y.

Heating Specialties. Bulletin V260. Trane Co., LaCrosse, Wisc.

Combination Lavatory and Shampoo Faucets. Royal Brass Mfg. Co., 1418 E. 43rd St., Cleveland, Ohio.

Duo-Stream Shower Head. Royal Brass Mfg. Co., 1418 E. 43rd St., Cleveland, Ohio.

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Contour Machining. A handbook, revised edition, covering contour sawing for filing of 48 different materials. Continental Machine Specialties, Inc., 1301 Washington Ave., S., Minneapolis, Minn.

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Crescent Bronze Powder Co., Chicago, Ill

AMMETERS (See also Electrical Apparatus and Equipment.)
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Harshaw Chemical Co., The, Cleveland, O.
Lasalco, Inc., St. Louis, Mo.
McGean Chemical Co., The, Cleveland, Ohio
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Munning & Munning, Newark, N. J.
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Handy & Harman Co., New York
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Lasalco, Inc., St. Louis, Mo.
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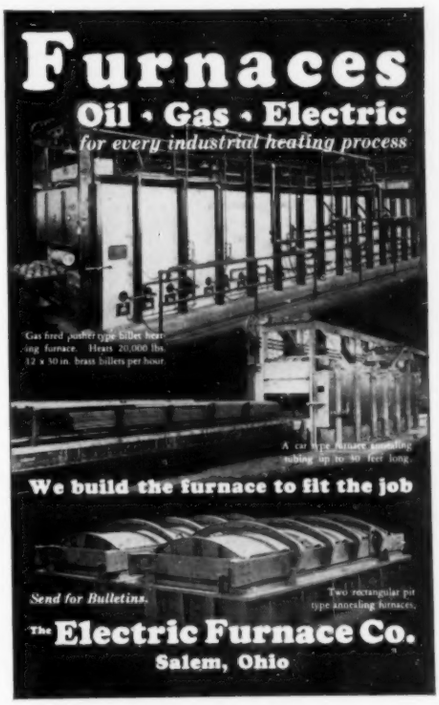
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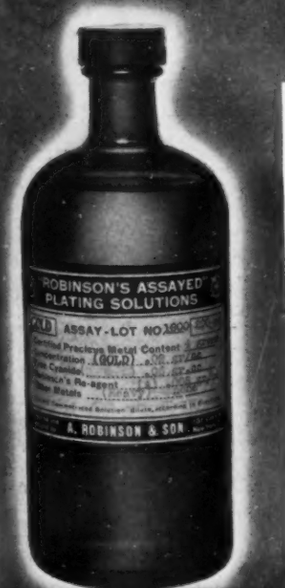

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Crescent Bronze Powder Co., Chicago, Ill.

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Bruce Products Corporation, Detroit, Michigan
Gumm Chemical Co., Inc., Frederic, Kearney, N. J.
International Chemical Co., Phila., Pa.
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Oakite Products, Inc., New York, N. Y.
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Bruce Products Corporation, Detroit, Michigan
Crown Rheostat & Supply Co., Chicago, Ill.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lea Mfg. Co., The, Waterbury, Conn.
Chas. F. L'Hommedieu & Sons Co., Chicago, Ill.
Matchless Metal Polish Co., Chicago, Ill. and Glen Ridge, N. J.
J. C. Miller Co., Grand Rapids, Mich.
Plating Products Co., Newark, N. J.

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NOW TRY THE BEST
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Metal Melting Furnaces
All capacities, with and without crucibles, using Oil, Gas, Coal, Coke and Air.
For ferrous and non-ferrous metals and iron alloys of Nickel, Chromium, etc.
Shipment prompt, terms arranged.
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Bruce Products Corporation, Detroit, Michigan
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Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lea Mfg. Co., The, Waterbury, Conn.
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Munning & Munning, Newark, N. J.
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Stutz Mfg. Co., George A., Chicago, Ill.
Yerges Mfg. Co., The Fremont, O.
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Eastern Felt Co., Winchester, Mass.
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BUFFS (Also see Buffing and Polishing Wheels.)
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Bias Buff & Wheel Co., Inc., The, Jersey City N. J.
Bruce Products Corporation, Detroit, Michigan
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Hargy Buff Co., Lockland, Ohio
L'Hommedieu, Charles F. & Sons, Inc., Chicago, Ill.
Matchless Metal Polish Co., Chicago, Ill. and Glen Ridge, N. J.
Miller, J. C. Co., Grand Rapids, Mich.
Munning & Munning, Newark, N. J.
Stevens, Inc., Frederic B., Detroit, Mich.
Stutz Mfg. Co., George A., Chicago, Ill.
Yerges Mfg. Co., The Fremont, O.

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Belke Mfg. Co., Chicago, Ill.
Bias Buff & Wheel Co., Inc., The, Jersey City N. J.
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Magnuson Products Corp., Brooklyn, N. Y.
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Oakite Products, Inc., New York, N. Y.
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Bruce Products Corporation, Detroit, Michigan
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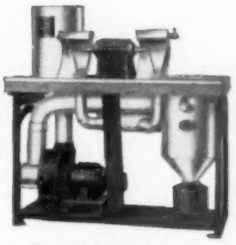
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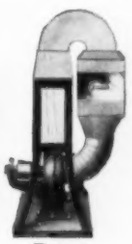
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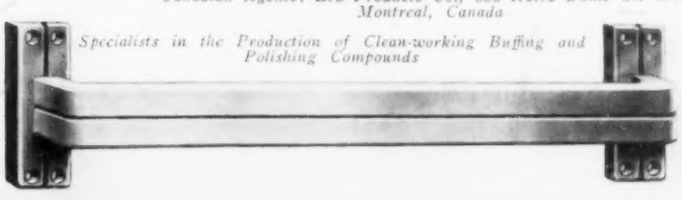

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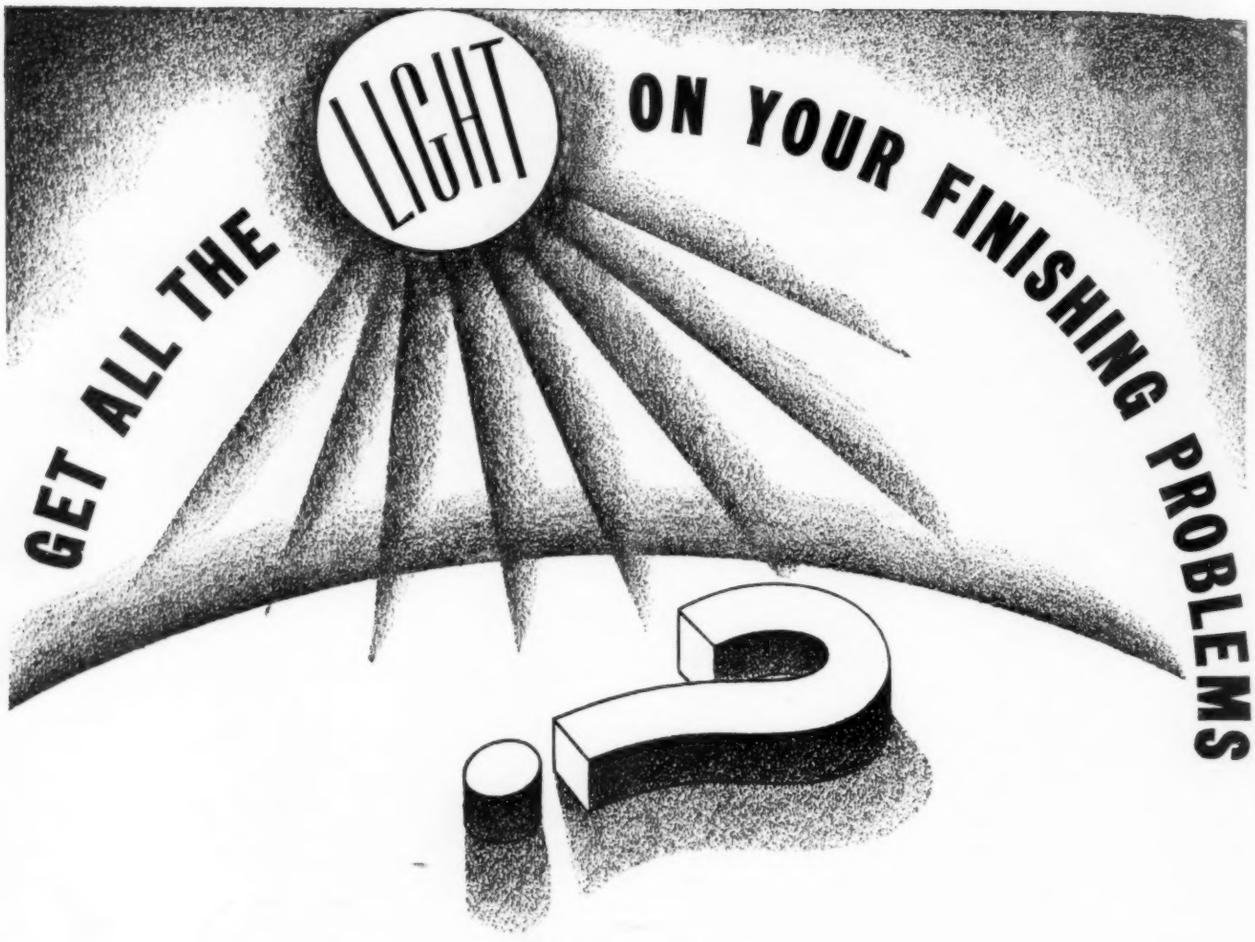

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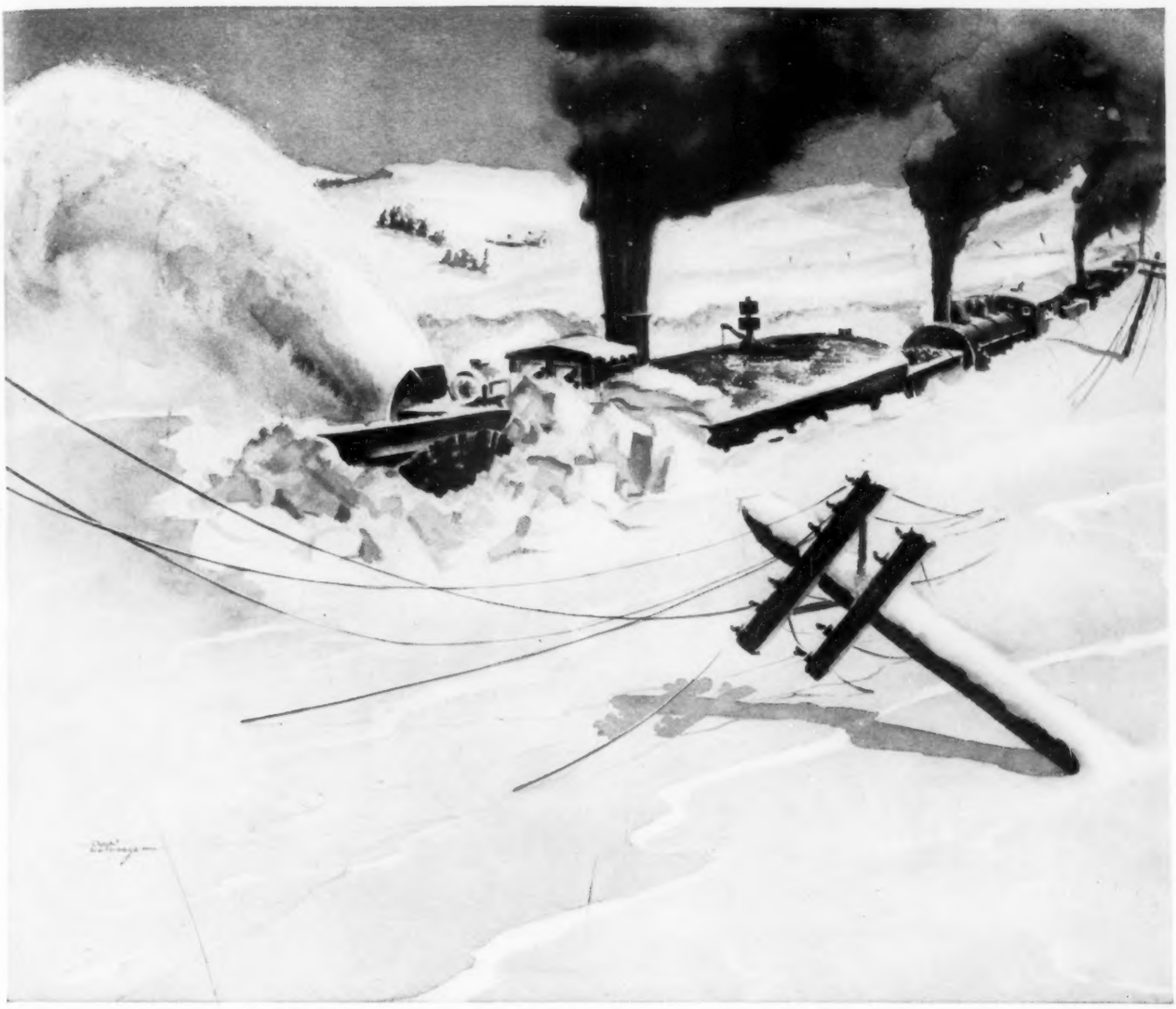

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